Public Services and Procurement Canada | Services publics et Approvisionnement Canada

TECHNICAL SPECIFICATIONS FOR

Trent-Severn Waterway Infrastructure

Central Bundle:

Reconstruction of Dam at Lock 28, Burleigh Falls Dam

Project No. R.076951.705

May 13th, 2020

Trent-Severn Waterway Infrastructure
Central Bundle:
Reconstruction of Dam at Lock 28, Burleigh Falls Dam

Technical Specifications

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PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Title and Description of Work

.2 Contract Method

.3 Work planning

.4 Parks Canada Agency occupancy and operation of navigation lock

1.2 GENERAL

.1 For Federal Government projects, Division 1 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

.1 Work of this Contract is comprised of reconstruction of the Dam at Lock 28 of the Trent- Severn Waterway (TSW) located approximately 35 km north of the Town of Peterborough, ON (44° 33′ 26″ N and 78° 12′ 25″ W); and further identified as PSPC Project R.076951.705.

.2 The Construction Work includes but is not limited to the following:
- .1 Mobilization-demobilization;
- .2 Submittals (environmental management plans, health and safety plans, shop drawing, permitting, designs, schedules, access plans, materials sheets, as-built surveys, etc…);
- .3 Independent quality control;
- .4 Obtaining regulatory permits, certificates of authorization and approvals;
- .5 Temporary Site Access including access to dewatered areas;
- .6 Construction facilities/staging areas;
- .7 Vehicular traffic control/detours;
- .8 Public and Waterway Navigation safety;
- .9 Drainage, sediment and erosion control and other environmental protections and monitoring;
- .10 Modifying the existing dam to be used as a cofferdam: void treatment, anchoring, sill lowering, infiltration control, operating system, and operation of the 5 lower logs during phase 2;
- .11 Cofferdams and dewatering of the work area, including maintenance of the dewatering system;

.12 Water diversion/cofferdam work, including maintenance and operation of the diversion system;
.13 Protection/Stabilization of the existing lock and dam structures to remain and other works including embankments, walls, buildings/facilities, during construction;
.14 Preparation and implementation of an Emergency Response Plan (ERP), Operation/Monitoring/Surveillance Plan (OMS) for the Contractor's temporary works;
.15 Demolition of the existing concrete dam structure including secondary structures, of earth embankments and existing house within work area limits;
.16 Salvage of the existing manual winches, rails, stop log lifter, stop logs, life safety rings, signage, water level and other identified equipment;
.17 Construction of the new concrete dam structure and related work, south gravity dam, sluiceways, north gravity dam, north retaining wall, north closure wall;
.18 Public safety enhancements including supply and installation of safety signage, buoys, temporary and permanent safety booms and handrails;
.19 River and embankment erosion and stability protection;
.20 Removal of cofferdam, water diversion system and other temporary works;
.21 New Log lifter commissioning (x3) and transport;
.22 Existing dam sluice and operating system commissioning (gains, heaters, logs and gantry);
.23 Dam commissioning;
.24 Site reinstatement and restoration;
.25 Lovesick campground restoration even if not used for construction.

.3 In addition, the work under this contract, the Contractor will also be responsible for:
.1 The design, approvals and monitoring work associated with installing and maintaining the temporary water control works (cofferdam, water diversion, stabilization of lock wall, dewatering, sediment control etc.) including temporary operation systems (gains, heaters, logs and gantry);
.2 The design, approvals and monitoring work associated with temporary construction works (stabilization of embankments and structures to remain, water and sediment control etc.);
.3 Acquiring or leasing additional nearby land(s) for the purpose of temporary staging area(s)/construction facilities.

1.4 LOCATON OF WORK

.1 Dam at Lock 28 is located between Lovesick Lake and Stoney Lake upstream of Burleigh Falls, approximately 35 km north of the Town of peterborough, ON. The address is 4810 Highway 28, Lakefield, K0L 2H0.

.2 The dam is one of 143 dams that are used to regulate the water levels for navigation on the Trent-Severn Waterway. The dam is owned and operated by the Parks Canada Agency (PCA).

1.5 EXAMINATION OF SITE

.1 Visit site before submitting tender. Examine site, adjacent premises, means of access and egress, and investigate and be fully informed of the nature and extent of the work required, difficulties in performing the work, site access, facilities available for delivery, placing, operating plant and for delivery of materials.

.2 A site visit will be organized to allow Bidders to examine site, adjacent premises, and condition of existing structure(s) before submitting a bid.

.3 Be completely familiar with every detail and intent of these specifications and scope of work to be performed, and regulatory requirements governing Work.

1.6 CONTRACT METHOD

.1 Construct Work under combined Price Contract

1.7 COST BREAKDOWN

.1 Within 15 days of notification of acceptance of bid, provide the Departmental Representative with a cost breakdown for both Lump Sum Amount and Unit Price Amount items as outlined in Section 01 22 01 Measurement and Payment.

1.8 CONSTRUCTION SCHEDULE AND CASHFLOW

.1 Within 15 days of Award of the Contract, provide the Departmental Representative with a copy of the Construction Schedule and estimated Cash Flow corresponding to the construction schedule in accordance with “Doing Business with PWGSC”.

.2 The construction schedule is to be prepared in accordance with Section 01 32 16.07 - Construction Progress Schedule - Bar (GANTT).

.3 The estimated cash flow is to be provided for each month of the fiscal year from April to March.
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1.9 CONTRACTORS'S TECHNICAL SUPPORT

.1 Within 15 days of Award of the Contract, submit a list of design engineers and specialists that will support the Contractor to deliver the project.

.2 Contractor's Technical Support Team must include (but not limited to):
.1 Environmental Specialist;
.2 Health and Safety Specialist;
.3 Dam Structure/hydraulic/Civil Engineer (Diversion, Cofferdams, Dewatering, Temporary works etc.);
.4 Monitoring Specialist (precision movement monitoring of temporary and permanent works);
.5 Qualified Surveyor (OLS and CLS certified) for layout and monitoring.

1.10 WORK PLANNING

.1 Plan and schedule the Work such as to allow the navigation lock, lock parking area and boat launch to remain open throughout the navigation season (first long weekend in May to thanksgiving long weekend in October). Works are not to impede PCA maintenance and operational preparation prior to opening, during and after closure of navigation.

.2 Construction Work for the cofferdam, diversion, dewatering system and stabilization work is to be planned, scheduled and executed by the Contractor to minimize interference with the use and operation of the lock by the Parks Canada Agency and with the boat launch use by the public.

.3 Plan and schedule in-water work and any tree removal work as to not interfere with restricted time periods as outlined in Section 01 14 00 - Work Restrictions.

.4 Road closures are to be minimized. If required, conduct road closures in accordance with authorities having jurisdiction. Account for school buses and emergency vehicles in any temporary road closure.

.5 Ensure that fire access/controls to work area and adjacent properties are maintained at all time.

.6 Maintain access to the dam and lock station for PCA staff all times. Advise PCA when vehicular access is to be temporarily restricted. Maintain access to the boat launch for public use during navigation season.

.7 Maintain/protect all structures, services and utilities that are to remain throughout the work. Undertake any relocations, permanent or temporary, to the requirement of the local authorities.

.8 Carry out work in accordance with Section 01 32 16.07 - Construction Progress Schedule - Bar (GANTT) and approved schedule.

1.11 ARCHAEOLOGICAL, CULTURAL AND ENVIRONMENTAL PROTECTION

.1 Trent-Severn Waterway, Lock 28 and the Dam at Lock 28 are National Heritage Sites.

.2 Parks Canada Agency is the main Environmental Authority for Trent-Severn Waterway Projects.

.3 The Contractor shall seek and obtain acceptance of Departmental Representative and PCA's Environmental Authority on submittals or changes in scope of work or methodologies that may affect archaeological resources, cultural resources or environment prior to providing direction to the Contractor.

.4 Comply with mitigation measures outlined in site-specific Impact Assessment (IA) and other federal, provincial, territorial or municipal act or regulation applying to the National Parks and Historic Sites of Canada.

.5 Changes to project scope of work not assessed under site-specific IA will require review and acceptance by Departmental Representative and may require issuing revised permit.

.6 Site may contain possible cultural and archaeological resources.

.7 Employ minimal intervention approach for all work.

.8 Damage to heritage elements will not be tolerated.

.9 All works to be done in accordance with requirements of Section 01 35 46 - ARCHAEOLOGICAL AND CULTURAL PROCEDURES.

1.12 WATER MANAGEMENT AND CONTROL

.1 PCA will continue their responsibility of water management and control on the Trent-Severn Waterway throughout the duration of the construction period.

.2 PCA will instruct the Contractor on water management operations, including stoplog manipulation of the lower 4 logs in sluices 8-12 of the existing dam using a separate system from the log lifter and manual winches on site and operation of the temporary gain heaters

.1 Temporary lower log operation system to be designed, fabricated, maintained and operated by the Contractor.

.3 The Contractor will operate the water diversion to control the water levels of the upper reach of the dam in accordance with PCA operational instructions. Refer to Section 01 14 00 – Work Restrictions and Section 35 20 22 - Dewatering and Diversion. Responsibilities will include (but not limited to):

.1 Contractor be available on a daily basis for water control (including weekends and statutory holidays)

.2 Contractor must conduct stoplog manipulation within two(2)hours of direction from the Parks Canada Agency

.3 Operations could occur multiple times a day

.4 The Contractor shall provide adequate environmental protection as per Section 01 35 46- Archeological and Cultural Procedures.

.5 Sequence of handover of water management operations for the lower 4 logs:

.1 Parks Canada Agency will continue the water management operations on the existing dam until the work on the existing dam is completed and sluices 1-7 are ready to be blocked.

.2 PCA will continue water management of the upper logs of the existing dam and on the new dam after commissioning and throughout the project.

.3 The contractor is to carry out operating the lower 4 logs

.4 The Contractor is to carry out water management operations on the water diversion system until phase 2 work has been commissioned and accepted by the Departmental Representative, the cofferdams have been deconstructed, and Parks Canada Agency has taken over the dam structure.

1.13 COORDINATION WITH PARKS CANADA AGENCY

.1 Parks Canada remains the sole authority for decisions on operation of stop logs affecting the flow downstream of the dam.

.2 There will be no operation of Perry Creek Dam 1, nor is water allowed to flow through the lock or above the north closure wall.

.3 Contractor shall provide safe access to the parking lot behind the lock master building or such other location agreed to by the Departmental Representative.

.4 Contractor shall limit use of premises for Work, storage and access to allow;
- .1 Parks Canada Agency staff access to the lock master building and dam;
- .2 Maintenance and operation of the dam by Parks Canada Agency staff during the construction period;
- .3 Unrestricted entry and egress to the lock by Parks Canada Agency staff and recreational boaters during the navigation season;
- .4 Access to the parking lot as defined by Contract Drawings.

.5 Any usage of the lock by the Contractor during the navigation season, for moving material or equipment will require 7 days notification. The lock will not be available to the Contractor outside the navigation season.

.6 Parks Canada Agency shall continue to have control and full access to the existing dam and new dam structure for water management operation
- .1 Existing stop log lifter path and rails are to stay clear of any element affecting its mobility, including snow and ice;
- .2 Manual winches to be kept on site. Must be kept on the rails on the north side of sluice 6 during phase 2.

.7 Provide a communication protocol with Parks Canada Agency acceptable to all parties including the Departmental Representative. Protocol must include three diversion operator contacts from the Contractor and three from the Parks Canada Agency.

.8 Coordinate daily with PCA on operations, even when no operation is planned.
- .1 Contractor to advise PCA when operator is not available;

.2 An operator, and two back-up, must be on call at all times including off hours, holidays and vacations (24 hours a day, 7 days a week, 365 days a year) from when diversion sluices are operational at the end of phase 1 until the 6 north sluices are operational at the end of phase 2;

.3 Operator response time to be under 2 h at all times.

1.14 CONTRACTOR USE OF PREMISES

.1 Contractor has use of site for the purpose of construction, as defined by the construction limit.

.2 Coordinate use of premises with Departmental Representative.

.3 Confine work, including temporary structures, plant, equipment and materials to established Construction Limit, unless otherwise agreed to in writing by the Departmental Representative.

.4 The Contractor will not have access or use of any lock master building, including the use of the public washrooms and parking area identified in the contract drawings.

.5 For construction facilities on Parks Canada Agency property, locate temporary buildings, access roads, drainage facilities, services and utilities for approval by the Departmental Representative and maintain in clean and orderly manner.

.1 Maintain lands within the construction limits starting from contract signature to site hand-off (mowing, cleaning, snow removal, etc.).

.6 If required, the Contractor, at their sole discretion, shall obtain and pay for use of additional off-site access, storage or staging areas needed. The use, maintenance, and restoration of additional off-site storage or staging areas are to be captured within a lease agreement between the Contractor and the property owner, exclusively.

.1 Contractor to provide a written release by property owner upon completion of restoration works.

.7 The use, maintenance, and restoration of all roadways shall be the sole responsibility of the Contractor.

1.15 PARKS CANADA AGENCY OCCUPANCY AND NAVIGATION LOCK OPERATION

.1 Parks Canada Agency shall have access to the lock master building, dam, the navigation lock and adjacent land at all times during entire construction period for execution of normal maintenance and operations

.2 Cooperate with Departmental Representative in scheduling operations to minimize conflict.

.3 The navigation lock shall remain open to recreational boaters throughout the navigation season.

1.16 COMMUNICATION PROTOCOL

.1 Due to nature of the work of on-going water management and control issues, and continued operation of the navigation lock, a communication protocol will need to be established between the Departmental Representative and the Contractor prior to commencement of work

.2 In general terms the Communication Protocol will address:
- .1 Daily communication related to water management and dam operations;
- .2 Communication related to urgent safety concerns;
- .3 Communication related to urgent environmental concerns;
- .4 Communication related to scheduled and unscheduled Contractor or Parks Canada Agency operation activities;
- .5 Communication related to construction and contract issues;
- .6 Communication with the general public.

1.17 SITE DOCUMENTATION

.1 Maintain on site, one copy of each document as follows:
- .1 Historic Canals Regulations Permit;
- .2 Contract Drawings (Full Size);
- .3 Specifications;
- .4 Addenda and amendments;
- .5 Change orders;
- .6 Reviewed Shop Drawings;
- .7 List of Outstanding Shop Drawings;
- .8 Field Test Reports;
- .9 Manufacturer’s installation and application instructions;
- .10 Copy of Approved Work Schedule,
- .11 Site Specific Environmental Protection Plan,
- .12 Waste Management Plan;

.13 Red Line drawings of As-Built Changes marked on drawings and specifications,
.14 Notice of Project issued by the Ministry of Labor,
.15 All items required to be maintained on site as per Section 01 35 29.06 - HEALTH AND SAFETY REQUIREMENTS,
.16 Site Specific Health and Safety Plan,
.17 Any other document deemed important by the Departmental Representative.

PART 2 - PRODUCT

2.1 NOT USED

.1 Not used

PART 3 - EXECUTION

3.1 NOT USED

.1 Not used

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Connecting to existing services

.2 Special scheduling requirements

.3 Critical dates

.4 Water level on the river

1.2 EXISTING UTILITIES AND SERVICES

.1 Notify Departmental Representative, utility companies and owner of other services (water, sewer, storm etc.) of intended interruption of utilities or services and obtain required permission.

.2 Where Work involves breaking into or connecting to existing utilities or services, give Departmental Representative 48 hours of notice for necessary interruption of mechanical or electrical service throughout course of work. Keep duration of interruptions to a minimum.

.3 Provide surveyed plans to Departmental Representative, Utility Companies and owner of other services of existing and temporary relocations of existing utilities or services to facilitate the Work. Obtain all permits and pay all associated costs for temporary works including relocating utilities or services to their final location. Coordinate schedule with respective companies and owners.

.4 Provide safety measures to maintain personnel, pedestrian, boat and vehicular traffic to the lock, parking and boat launch.

.5 Construct barriers and enclosures in accordance with Section 01 56 00 – Temporary Barriers and Enclosures.

1.3 NAVIGATIONS SEASON RESTRICTIONS

.1 Navigation Season: The Waterway is open to the general public for navigation from Friday prior to Victoria Day in May to Wednesday after Thanksgiving in October.

.2 Navigation Lock Operation Hours:
.1 Opening of navigation to last week in June
.1 Monday to Thursday: 10:00am to 3:30 pm.

.2 Friday to Sunday: 9:00am to 6:30pm.

.2 Last week in June to first week in September:
.1 Monday to Thursday: 9:00am to 5:30pm
.2 Friday to Sunday: 9:00am to 6:30pm

.3 First week in September to Closure of Navigation:
.1 Monday to Friday: 10:00am to 3:30pm.
.2 Saturday - Sunday: 9:00am to 4:30pm.

.3 These hours are subject to change.

.4 Karawatha Voyager cruise ship can access up to a week before and after navigation

1.4 ENVIRONMENTAL RESTRICTIONS

.1 Section 01 35 43 – Environmental Procedure list environmental restrictions and times frames that need to be considered in the planning of the Work.

1.5 EXISTING STRUCTURE ACCESS

.1 Notify Departmental Representative and local road authority of intended interruption of service or access.

.2 Maintain water access to Lock 28 during the navigation season and up to one week before and after.

.3 Provide and maintain adequate access to project site. Maintain public access to boat launch at all time except for periods of ice cover. Maintain access to lock station and a minimum of 3 parking spots at all times in lock station parking unless previously approved in writing by departmental representative.
.1 Abide with work areas described in contract drawings.
.2 When boat launch or parking access cannot be maintained due to work in the area, obtain approval form the departmental representative 2 weeks prior to closure.
.3 Strive to schedule closure outside of navigation season.
.4 Minimize time of interruption of access.
.5 Minimize time to launch vessels and obstruct boat launch

.4 The existing lock structure, north closure wall and the Perry Creek Dam 1 cannot to be used as part of the water diversion system or to assist with water management.

.5 Any usage of the lock during navigation season for moving material or equipment will require 7 days notification. The lock will not be available to the Contractor outside the navigation season.

.6 No heavy equipment is to be placed and operated in the immediate vicinity of the lock structures. To the greatest extent possible, maintain six (6) metres equipment clearance from the lock wall and lock approach walls of unless approved by the Departmental Representative.

.7 Maintain 24 hour access to PCA personnel to the site of diversion structures (existing dam and new dam). Any loss of access of any kind must to be approved prior to closure by Departmental representative

1.6 ROAD CLOSURE AND TRAFFIC DETOUR

.1 Undertake road closure and traffic detour as set out in Section 01 35 00.06 – Special Procedures for Traffic Control.

.2 Where work involves disruption to and rerouting of vehicular traffic, provide Departmental Representative with a Traffic Control Plan to the requirement of the local authorities and the standards set out in the Ontario Traffic Manual Book 7, Temporary Conditions.

.3 Provide a minimum of four weeks formal notification of detour to local road authorities, emergency services, Canada Post, and local school boards.

.4 Install road closure and construction advertising signs, two weeks in advance of planned road closure.

.5 Provide turn-around facilities at if required, to the requirements of the local municipality and authorities having jurisdiction.

1.7 ROAD AND BRIDGE LOAD RESTRICTIONS

.1 The Contractor is responsible to coordinate with local authorities for load restriction on haul routes

.2 The Contractor must obtain required authorization from MTO or local authorities before utilizing haul routes bridges.

.3 The Contractor must make additional arrangement at no additional cost to project if authorization is refused.

.4 The Contractor is responsible for any and all costs associated with any requirements of the local authority having jurisdiction.

.5 Half load restrictions: March 1 to April 30 or as directed by the Municipality or competent authorities.

1.8 SPECIAL REQUIREMENTS

.1 Parks Canada is the sole authority on decisions affecting flows in the waterway.

.2 Coordinate water levels and flows in Lovesick Lake and the Waterway with PCA to Section 35 20 22 - Dewatering and Diversion.

.3 Coordinate any operation of the diversion system control structure with Trent-Severn Waterway Operations prior to any manipulation of the logs. Failure to do so could result in unacceptable water flows and levels, and possibly flooding of the downstream reach.

.4 Provide continuous flow to isolated watered areas such as between south shore and access road in phase 3. Provide a minimum of 20 l/s by means of pumping or siphoning from Lovesick Lake.

.5 Maintain on-call personnel at all time for operation of some logs as detailed in Section 35 20 22 - Dewatering and Diversion.

.6 Any in-water work undertaken, including cofferdam installation, shoreline reinstatement in-water demolition or other activities, must occur outside the fishery spawning window of March 15 to June 30th. In-water work and work adjacent to the watercourse is to be done in accordance with Section 01 35 43 - Environmental Procedures.

.7 Vegetation removal, Tree cutting and clearing work is not to be undertaken during the migratory bird nesting season, between April 1 and August 31. Tree cutting and clearing work is to be done in accordance with Section 01 35 43 – Environmental Procedures and Section 31 11 00 -Clearing and Grubbing. Vegetation removal during this period is permitted, subject to approval by the Departmental Representative, with nest screening by a trained biologist to screen for birds and wildlife at no supplementary cost to the project.

.8 Obtain all regulatory permits and / or authorizations to Section 01 41 00 - Regulatory Requirements and implement measures to comply with permits and certificates of authorization requirements.

.9 The Contractor must comply with the load limit regarding the traffic on the existing dam deck

1.9 CONTRACTORS USE OF DEWATERED AREAS

.1 Contractor’s use of the dewatered area is limited for the sole purpose of construction activity. The dewatered area shall not be used for:
.1 The Contractor's construction facilities or staging area, including site washroom facilities, and workers parking area;
.2 Fuel storage or refueling station;
.3 Storage of machinery, equipment or material; and
.4 The contractor's brown water treatment facility.

.2 All equipment and machinery used within the dewatered area must be kept in good working condition and free of fuel, lubricants, coolant and other deleterious material that could enter the water body.

1.10 WATER LEVELS

.1 All water level elevations are managed in 1978 Geodetic Survey of Canada datum.

.2 All water elevation are indicative. Flood events or drought can take the levels outside of the normal range.

.3 The upstream range for the navigation level at Dam at Lock 28 is 241.4 m to 241.5 m.
.1 1:40-yr upstream levels are 241.8 m

.4 The downstream range for the level at Dam at Lock 28 is 236.5 to 241.5 depending on flow conditions.

.5 During the non-navigation season (October to May), the normal upstream water level varies between 240.00 m and 241.5 m.

.6 Sometime after the close of navigation season (May long weekend to October long weekend), the water level in the Trent-Severn Waterway, is lowered for the winter season.

.7 At a time determined by the Parks Canada Agency, the stop logs are placed in the various structures to allow the reaches to fill naturally during the spring freshet to the navigation season levels.

.8 The Contractor is solely responsible for making their own interpretation of the data included herein, and any received from the Parks Canada Agency.

.9 The Contractor is cautioned that, while the Parks Canada Agency endeavors to manage the water levels within the indicated ranges, it cannot be held responsible for events, or the result of events, that are not under its control.

.10 The Contractor shall advise Parks Canada Agency for moving stop logs if it's required for its own activities. No operation of logs is allowed without departmental representative written authorisation.

1.11 HOURS OF WORK AND NOISE LIMITATION

.1 The normal hours of work are to be in accordance with the noise and work hour by-laws of the local municipality.

.2 In addition, PCA's minimum requirement is to avoid excessive noise between 7 PM and 7 AM.

.3 Contractor to obtain noise permit if applicable.

.4 The Contractor is not to work during nights (7PM to 7 AM), the weekend and public holiday without prior authorization from the Departmental Representative. Coordinate timing with the Departmental Representative.

.5 Noise Level to respect Ontario regulation O. Reg. 381/15, latest version.

.6 Construction must not generate noise higher than 85 dBA at the limits of the construction site: fence, within 10 m of land used on private property and within 50 m of construction on the waterway.
.1 Construction machinery and trucks to use white noise for reversing alarms.

.7 Contractor must try to schedule high noise activities outside of the navigation season.

1.12 CRITICAL PROJECT DATES

.1 Project deadlines are as follows
.1 Phase 1 works (existing dam) must be completed by December 22nd 2020
.2 In water works for dewatering of phase 2 must be completed by March 15th 2021
.3 All construction work of phase 2 must be completed by December 22nd 2021
.4 In water works for dewatering of phase 3 must be completed by March 15th 2022

.5 Cofferdam for dewatering of phase 3 must be removed by March 15th 2023

.6 All in water works must be completed by march 15th 2023

.7 Site restauration, substantial completion and handover deadline is august 1st 2023

PART 2 - PRODUCT

2.1 NOT USED

.1 Not used

PART 3 - EXECUTION

3.1 NOT USED

.1 Not used

END OF SECTION

PART 1 - GENERAL

1.1 MEASUREMENT AND PAYMENT

.1 No separate measurement for payment shall be made for items under this section. Include cost in the contract Lump Sum Amount.

.2 Payments related to this Section shall be as set out in Section 01 22 01 – Measurement and Payment.

1.2 DESCRIPTION

.1 Dam at Lock 28 is located upstream Of Burleigh Falls between Lovesick lake and Stoney Lake. Access to the site is on Highway 28.
.1 4810 Highway 28, Lakefield, K0L 2H0

.2 The work of this Section includes but is not limited to:

.1 The use of local and regional roads to access the Work area.
.2 The acquisition or rights, construction, use and disposal of land access to the site.
.3 Acquisition and use of Contractor staging area(s).
.4 Providing construction fence and perimeter security measures around work area.
.5 Maintaining the work/storage area for the duration of the work.
.6 Removal of the temporary facilities and access.

1.3 MEASUREMENT AND PAYMENT PROCEDURES

.1 Payment of this Section shall be as set out in Section 01 22 01 – Measurement and Payment.

1.4 SUBMITTALS AND SHOP DRAWINGS

.1 Undertake submittals including shop drawings to Section 01 33 00 – Submittal Procedures.

.2 Be responsible for the conceptual and detailed design of all access systems.

.3 Submit shop drawings showing layout and details of access systems to the Departmental Representative for review and acceptance.

.4 Provide a plan of the usage/layout of the Parks Canada Agency (PCA) lands for review by the Departmental Representative.

.1 Include measures which eliminates the tracking of mud onto local roads, from the work site or laydown and storage areas. The Contractor is responsible for maintaining the cleanliness of the roadway to the satisfaction of the Departmental Representative.

.5 Provide a Restoration Plan for Parks Canada Agency's lands acceptable to the Departmental Representative. The restoration plan shall include the removal of the contractor’s temporary works, regrading of the affected areas, reconstruction of the parking area, access road, and the landscaping work as set out in the contract drawings.

.6 Provide a lease, use and restoration plan for the Lovesick Campground use of land to be negotiated by the contractor. The plan must outline all disturbances, mitigation and potential issues and ways to solve them (environmental, noise, hours of operation, mechanism of conflict resolution…) and be accompanied with a letter of acceptance from the campground owner.

.1 The plan must include at minimum the restoration works set out in the contract drawings for disturbances incurred in a previous contract.

.7 Provide a restoration plan for any other private land use negotiated by the contractor to cover staging, access, parking, mooring or any other use of land. The plan must be accompanied with a letter of acceptance form the owner.

1.5 ACCESS TO THE WORK

.1 A boat launch is available on the north side of the site at lock 28. Use boat launch only to launch vessels, do not block boat launch and mooring points.

.2 The dam site can be accessed by either the south or the north side from highway 28.

.1 North access: access via PCA lands at civic address 4810 Highway 28, Lakefield, K0L 2H0.

.2 South access: access through Lovesick Lake Campground (to be negotiated by contractor directly), overland or via a combination of jetty and overland (within in-water footprint provided), or using a temporary bridge form the north side. No vehicular access will be allowed on newly constructed dam sections.

.3 For the access to the work and to the Contractors off-site facilities/staging areas by local roads and highways, obtain any required permits from the authorities having jurisdiction. The work includes, but is not limited to:
- .1 Prepare a traffic control and detour plan in accordance to Section 01 35 00.06 and the requirements of the authorities having jurisdiction
- .2 Confine activities to such routes and load limits as specified by the authorities having jurisdiction.
- .3 Clean, maintain, and undertake dust control on haul routes in accordance with the authorities having jurisdiction and Section 01 35 43 – Environmental Procedures.
- .4 A copy of the permit and agreed arrangements with the authorities having jurisdiction for the usage of local roads and highways is to be provided to the Departmental Representative.

.4 Ensure that fire access/controls to work area and adjacent properties are maintained at all time.

.5 Contractor to ensure safe ingress-egress from construction site.

.6 As part of the planning for the access to the work site via the local roads make provisions for:
- .1 Vehicular access to private residences and cottages;
- .2 Local businesses;
- .3 Safe area for children boarding a school bus;
- .4 Access for Parks Canada Agency staff members to the Lock Station and public to the lock, boat launch and paring lot.

1.6 CONTRACTORS STAGING AREA (S)

.1 The Contractor is responsible to acquire and pay for additional land for use and staging area/construction facilities. In general terms the staging area(s) is to be used for the following, but not limited to:
- .1 Fuel storage and refueling station, with containment measures acceptable to the Departmental Representative;
- .2 Parking of machinery;
- .3 Material delivery area and temporary storage site for construction/demolition material and waste;
- .4 Facilities including site-office/trailers, site washroom facilities and workers parking area;
- .5 Associated power generators;

.6 Sediment settling basin/filtration system for the dewatering activities;
.7 Drying/stockpiling excavated material;
.8 Temporary storage of material as acceptable to the Departmental Representative.

.2 All lease agreement for land acquired or leased outside of the Project Area between Contractor and landowners is to be negated if main contract between the Crown and the contractor is canceled.

.3 Modification / change in the use of the staging area(s) on PCA land is to be approved by the Departmental Representative.

.4 Prior to mobilization onto the staging area(s), undertake environmental testing of each site in accordance with the requirement of Ontario Regulation 511/09 "Soil, Groundwater and Sediment Standards for Use under Part XV.1 of the Environmental Protection Act, dated April 2011". Provide all testing reports to the Departmental Representative.

.5 Obtain all permits as required for the use and preparation of the site. Provide all permits to the Departmental Representative.

.6 The contractor is responsible for any clear cutting of trees and shrubs and their disposal, and the site preparation to the requirements of all local bylaws and regulatory agencies and to the approval of the Departmental Representative.

.7 Provide details of site preparation for the intended usage.

.8 In preparing this area, the Contractor needs to consider the general grading and drainage of the property and ensure that any work being done for the preparation of these areas will not cause additional runoff toward neighbouring properties. The Contractor shall protect existing water wells, water supply lines, drain lines, related utilities and services.

.9 Construct access road/entrance to the requirements of the local authority having jurisdiction. Include the construction of a mud mat at staging area entrance and such other areas as may be deemed necessary by the Contractor.

.10 Install construction fencing at staging area on Parks Canada Agency property, to the extent as shown on contract drawings and as requested by the Departmental Representative.

.11 Address the tracking of mud onto local roads. Implement the approved plan.

.12 At completion of the Work, prior to land restoration, undertake further environmental testing in accordance with the requirement of Ontario Regulation 511/09 "Soil, Groundwater and Sediment Standards for Use under Part XV.1 of the Environmental Protection Act, dated April 2011" and provide results to the Departmental Representative, highlighting non-conformance. This testing is to confirm that the areas have not been contaminated as result of the work by the Contractor. The Contractor shall bear the cost of removal, disposal and replacement of any contaminated soil.

1.7 ACCESS TO AND USE OF PARKS CANADA AGENCY PROPERTY

.1 Restrict usage of Parks Canada Agency property to agreed construction limits as set on the contract drawings.

.2 Maintain access and utilities to the Parks Canada Agency Lock Master building

.3 Maintain vehicular and pedestrian access to requirements set out in Section 01 55 00 – Construction facilities to the Lock 28 site and lock parking and boat launch.

.4 Respect set speed limits and operate construction vehicles in such a way as to minimize dust and noise. The power supply to any affected facilities needs to be restored, to applicable regulation upon completion of the work.

1.8 PRE-CONDITION ASSESSMENT

.1 Carry out a Pre-Construction inspection and document the condition of staging areas, parcs Canada lands including parking lots, boat launch, lock retaining walls, south side cottage area, any private land used as part of the project, haul routes and other items as described in Section 01 48 00 – Construction Control and Monitoring.

.2 Provide a pre-construction record of the approved haul route annotated as to location, and any road deficiencies as set out in Section 01 20 01 – Site Access.

1.9 DELINEATION OF WORK/STORAGE AREA

.1 Supply, install, and maintain for the duration of the work a construction fence delineating the work area as shown on the contract drawings and as agreed by the Departmental Representative.

.2 Provide secure entrances to all openings in the perimeter fence to prevent public access to the work areas at all times during construction.

.3 Remove the fences in their entirety from the site after work is completed. All repairs to be undertaken at the Contractors expense.

1.10 PARKING

.1 Abide with parking restriction set out in section 01 52 00 Construction Facilities

.2 Contractor to always leave public access to the boat launch and the part of the lock parking area as described on construction drawings as described in section 01 14 00 – Work Restrictions.

1.11 SNOW CLEARING

.1 Contractor is responsible for snow clearing within all areas necessary to complete the work including, but not limited to, staging areas, parking areas, accesses, work areas, dewatered areas, lock station parking, a vehicle-wide path to the lock station and boat launch.

.2 Included in these areas is all snow removal to access these areas or to complete the work.

.3 Contractor will not be responsible for clearing the snow on public routes. No claims will be considered should these public haul routes become inaccessible during the course of the work.

1.12 SECURITY

.1 Secure the work area in a manner satisfactory to the Departmental Representative. This includes fencing off the construction site to prevent public access to all areas where construction activities occur.

.2 Take appropriate security precautions to safeguard equipment, tools, and materials on site.

PART 2 - PRODUCTS

2.1 STAGING AREA AND OTHER SITE ACCESS

.1 Materials imported to the site must be acceptable to the Departmental Representative.

.2 Imported fill materials shall meet the chemical properties for materials at or near water in accordance with the requirement of Ontario Regulation 511/09 "Soil, Groundwater and Sediment Standards for Use under Part XV.1 of the Environmental Protection Act, dated April 2011" – Table 8 - Generic Site Condition Standards for Use within 30 m of a Water Body in a Potable Groundwater Condition.

PART 3 - EXECUTION

3.1 REQUIREMENTS REGULATORY AGENCIES

.1 Obtain approvals from and pay all fees of Federal, Provincial Agencies and Municipal Authorities for works as may be required by this Contract.

3.2 TRAFFIC CONTROL

.1 Implement a traffic management plan and all

.2 Required signage and traffic control devices as set out in Section 01 35 00.06 – Special Procedures for Traffic Control.

3.3 REMOVAL

.1 Any material placed on the river bottom for temporary access to the work and for environmental management is to be removed

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 This section provides a list of work items covered under the Contract Lump Sum Amount and the procedures for payment that will be applied to these work items within the Contract Lump Sum Amount.

.2 This section covers the measurement of work for payment purposes, and the scope of work included in the pay items in the Unit Price Table.

1.2 LUMP SUM AMOUNT ITEMS

.1 Lump Sum Amount - All Work other than that which is specifically designated in the Unit Price Table shall be included in the Contract Lump Sum Amount. This item includes all costs to undertake the Work.

.2 The items of work listed below are not intended to be complete, but are provided to give an indication to the Contractor of how the Contract Lump Sum Amount must be broken down for payment purposes. As such, it is the Contractor's responsibility to ensure that all items of work not covered under the Unit Price Table are covered in the Contract Lump Sum Amount.

.3 Items of work to be considered in the Contract Lump Sum Amount are, but not limited to:

.1 Mobilization/Demobilization

- .1 Examination and preparation.
- .2 General site preparation, clearing and grubbing, soils stripping etc.
- .3 General maintenance and cleaning of work site, site access, and haul routes.
- .4 Site security including, fencings, signage, guards, etc…
- .5 Snow removal.
- .6 Temporary utilities.
- .7 Site offices and buldings.
- .8 Shop drawings.
- .9 Coordination, reporting and meetings.
- .10 Precondition assessment and surveys.
- .11 Submittals and permitting.
- .12 Submittals, approvals, permits and fees (other than specified below).
- .13 Agreements/permits/authorization and releases with private landowners, municipalities and other authorities having jurisdiction.
- .14 Closeout documentation.
- .15 Dust and noise management.

.16 Restoration outside of identified work area limits.
.17 Protection, maintenance, relocation and reconnection of existing services and utilities.

.2 Temporary accesses including in-water accesses, land accesses outside of work area and within dewatered area.

.3 Contractor Staging Areas and accesses (off-site and outside of identified work area)- Construction/deconstruction including, but not limited to:
.1 Preparation, clearing and grubbing, soil stripping, rough grading and granular backfill, drainage of area etc. as required;
.2 Sediment and erosion control measures;
.3 Temporary utilities;
.4 Site security;
.5 Construction Fencing;
.6 General maintenance and cleaning;
.7 Dust and noise management;
.8 Land restoration (as per lease agreement);
.9 Lease agreement payment (as required).

.4 Quality Management plan and implementation including but not limited to, QVE services, quality control, ITP, testing etc.

.5 Traffic Control - Temporary measures for vehicle and navigation traffic control provisions and maintenance

.6 Dewatering and Diversion - Design and approvals, construction, maintenance, operation (including record keeping), deconstruction and restoration.

.7 Dewatering/Recharging - Dewatering and dewatering maintenance, including removal of fish trapped in dewatered area, and recharging of dewatered area.

.8 Construction Control and Monitoring - Condition surveys, monitoring

.9 Drainage/Sediment/Erosion Control - Temporary drainage, sediment and erosion control and treatment at work area, construction, maintenance and removal.

.10 Occupational Health and Safety Measures.

.11 Environmental, Cultural and Archeological Protection Measures.

.12 Log lifter management and commissioning

.13 Commissioning of dam

.14 Salvage of:
.1 Existing log lifter
.2 Existing winches
.3 Existing stop logs
.4 Existing signage
.5 Existing safety booms and aerial cables

.15 Exiting dam temporary works

.1 Void treatment
.2 Existing dam lower log operation system
.3 Deck extension including rail and guardrails

.16 House demolition, including disposal off site and hazardous substances abatement.

.17 Any other required item not identified in Lump Sum or Unit Price Table.

.4 Contractor to provide a cost breakdown of elements under this item

1.3 CONTRACT LUMP SUM AMOUNT WORK ITEMS PAYMENT PROCEDURES

.1 Any items not specifically mentioned in Lump Sum and Unit price but required for construction is to be included in the Lump Sum Amount.

.2 Items of Work will be paid within Contract Lump Sum Amount at completion of the particular item of work, as set out below and subject to the approval of the Departmental Representative.

.1 Mobilization/Demobilization - 30% initial mobilization, 20% on completion of demobilization, and 50% pro-rated over duration of Contract.

.2 Contractor Staging Areas (off-site) - 50% construction activity, 30% deconstruction activities, and 20% maintenance activities pro-rated over duration of Contract.

.3 Temporary accesses including in-water accesses, land accesses outside of work area and within dewatered area. 50% construction activity, 30% deconstruction activities, and 20% maintenance activities pro-rated over duration of the work item.

.4 Quality Management plan and implementation 10% initial activities (program development and approvals/installation of measures/initial work), 10% removal of measures/reporting and 80% pro-rated over duration of the work item.

.5 Traffic control - 20% initial activities (program development and approvals/installation of measures/initial work), 10% removal of measures and 70% pro-rated over duration of the work item.

.6 Dewatering/Recharging - 20% initial activities (program development and approvals/installation of measures/initial work), 10% removal of measures/reporting and 70% maintenance/monitoring pro-rated over duration of the work item.

.7 Drainage/Sediment/Erosion Control - 20% initial activities (program development and approvals/installation of measures/initial work), 10% removal of measures/reporting and 70% maintenance/monitoring pro-rated over duration of the work item.

.8 Occupational Health and safety measures: 10% initial activities (program development and approvals/installation of measures/initial work), 10% removal of measures/reporting and 80% pro-rated over Contract duration.

.9 Environmental, Cultural and Archeological Protection Measures. 10% initial activities (program development and approvals/installation of measures/initial work), 10% removal of measures/reporting and 80% pro-rated over Contract duration

.10 New Log lifter management and commissioning, 20% at commissioning of new log lifter at another site, 30 % at installation on new dam, 30% at commissioning at new dam phase 2, 20% commissioning at new dam phase 3.

.11 Commissioning of dam: 5%/modified sluice (phase 1, 5 sluices), 35% commissioning at phase 2, 40% commissioning at phase 3.

.12 Salvage: 30 % removal/disassembling, 70% delivery at another site and reassembly. Separated 80% log lifter and 20% other items.

.13 Exiting dam temporary works

.1 Void treatment,60% construction activities, 40% pro-rated over duration of the work item.

.2 Existing dam lower log operation system, 20% initial activities, 40% construction activities, 20% commissioning, 20% pro-rated over duration of the work item.

.3 deck extension: 10% initial activities,80% construction activities, 10% demolition

.14 House demolition, including disposal off site and dangerous substances abatement. 80% Construction activities, 20% reinstatement

.15 All other costs associated with the work will be pro-rated over duration of Contract.

1.4 UNIT PRICE TABLE ITEM MEASUREMENT AND PAYMENT PROCEDURES

.1 No payment will be made for installation/operation beyond what's shown on the drawings/without receipt of written authorization by the Departmental Representative; any overages without prior written authorization by DR at the Contractor's expense.

.2 Any items not specifically mentioned in lump Sum and Unit price but required for construction is to be included in Lump Sum Amount.
.1 No additional pay item will be considered than those specifically identified in the Lump Sum and unit price table.

.3 Unit price items must include, but are not limited to:
.1 Labour;
.2 Transport and hauling;
.3 Materials;
.4 Methods;
.5 Protection of other works;
.6 Delivery, transport and disposal;
.7 Incidental work, elements and materials;
.8 Inclement weather mitigation;
.9 Cold weather work;
.10 Delays;
.11 Waste;
.12 Corrective measures;
.13 Other items and incidental costs not specifically mentioned but required to complete work as set out in the Contract documents.

.4 Item No. 1 - Staging and temporary accesses (on Parks Canada Agency property within work area limits and excluding access and staging on private land, in-water and within dewatered area) - Construction/deconstruction including:
.1 Preparation, clearing and grubbing, soil stripping, rough grading and granular backfill, drainage of area etc. as required;
.2 General maintenance and cleaning;
.3 Removal and disposal off-site.
.4 Payment per m^2: 60% construction activity, 20% pro-rated over duration of work item, 20% removal

.5 Item No. 2 – Existing Dam sill lowering. Lowering of sluices 8-12 in the existing dam including:
.1 Dewatering (pier nosings, bulkhead, meter bags, pumping…);
.2 Demolition;
.3 Surface repairs;
.4 Sill;
.5 Heated gains;
.6 Electrical work.
.7 Payment Per sluice: 10% initial activity, 20% dewatering, 40% demolition and construction activity, 30% commissioning.

.6 Item No. 3 – Post-tensioned anchor (with casing). Anchoring of existing dam including:
.1 Seepage and environmental controls;
.2 Drilling;

.3 Casing installation;
.4 Grouting;
.5 Water test;
.6 Mechanical Anchors installation;
.7 Tension test;
.8 Anchor niche cover.
.9 Payment Per anchor: 100% at successful tension test.

.7 Item No. 4 – Post-tensioned anchor (without casing). Anchoring of existing dam including:
.1 Seepage and environmental controls;
.2 Drilling;
.3 Grouting;
.4 Water test;
.5 Anchors installation;
.6 Tension test;
.7 Anchor niche cover.
.8 Payment Per anchor: 100% at successful tension test

.8 Item No. 5 – Stage 1 - downstream dewatering (excluding dewatering of existing sluices 8-12) for construction of phase 1 deck extension including.
.1 Design and approval;
.2 Cofferdam;
.3 Dewatering;
.4 Maintenance;
.5 Removal.
.6 Payment Per linear m of cofferdam: 60% installation, 20% prorated over work item duration, 20% removal

.9 Item No. 6 - Weekdays, 7am to 7pm: Mobilisation and operation of up to three set of bottom log.
.1 Operating personnel on call;
.2 Mobilization/demobilization to site in specified time;
.3 Operations;
.4 Moving lower log lifting system in designated storage location.
.5 Payment Per unit.

.10 Item No. 7 – Night, 7pm to 7am), weekend, and holiday: Mobilisation and operation of up to three set of bottom log.
.1 Operating personnel on call;
.2 Mobilization/demobilization to site in specified time;
.3 Operations;
.4 Moving lower log lifting system in designated storage location;
.5 Payment Per unit.

.11 Item No. 8 – Set lower steel logs assembly

.1 Payment Per unit: 80% delivery, 20% commissioning.

.12 Item No. 9 – Existing dam seepage control – phase 2 and 3
.1 Payment per linear meter of existing dam used as cofferdam, 60% installation, 20% removal, 20% maintenance prorated over work item.

.13 Item No. 10 – Downstream cofferdam, parallel to flow
.1 Design, maintenance, deconstruction, reinstatement;
.2 Cofferdam common to phase 1 and 2 is paid once, include reversal of bracing;
.3 Includes phase 2 new dam tie in with existing structure, including walkway and guardrails.
.4 Payment Per sluice: 5% initial activity, 70% construction activity, 25% removal.

.14 Item No. 11 – Downstream cofferdam, perpendicular to flow, phase 2
.1 Design, maintenance, deconstruction, reinstatement.
.2 Payment Per sluice: 5% initial activity, 70% construction activity, 25% removal.

.15 Item No. 12 – Downstream cofferdam, perpendicular to flow, phase 3
.1 Design, maintenance, deconstruction, reinstatement.
.2 Consider material re-use from phase 2.
.3 Payment Per linear meter: 5% initial activity, 70% construction activity, 25% removal

.16 Item No. 13 – Common excavation
.1 Excavation required to complete the permanent works of the new structure and demolition works of existing structure, including hauling, stockpiling and disposal.
.2 Excludes excavation for temporary work, temporary accesses, and laydown and staging areas.
.3 Payment Per cubic meter measured on pre existing survey and final common excavation survey.

.17 Item No. 14 – Rock excavation
.1 Excavation required to complete the permanent works of the new structure and demolition works of existing structure, including hauling, stockpiling and disposal.
.2 Excludes excavation for temporary work, temporary accesses, and laydown and staging areas.
.3 No payment will be made for rock excavation beyond the limits shown on the drawings which

has not been authorized by the Departmental Representative; any over-break beyond these limits shall be replaced by concrete at the Contractor's expense.

.4 Include in the price of rock excavation the cost of rock crushing and associated work for reuse.

.5 Payment Per cubic meter measured on pre existing final common excavation survey and final rock excavation survey.

.18 Item No. 15 – Concrete demolition

.1 Include in water demolition including environmental protection and mitigation measures, marine works, removal, hauling and disposal off site and reinstatement of leftover structures.

.2 Payment Per cubic meter as per existing drawings.

.19 Item No. 16 – Dental excavation

.1 Payment Per cubic meter measured by tape with DR as per excavation drawings.

.20 Item No. 17 – Filler concrete

.1 No payment will be made for concrete delivered on site and not installed, include forming and rebar.

.2 Payment per cubic meter of concrete actually poured.

.21 Item No. 18 – Concrete works south gravity dam

.1 This item includes forming, reinforcing steel dowels, waterstops, waterproofing bands, joint seals, anchor bolts, enclosures, heating, cooling, curing, finishing, edges and associated works, excluding miscellaneous metal work.

.2 Payment per cubic meter of concrete actually poured.

.22 Item No. 19 – Concrete works north gravity dam

.1 This item includes forming, reinforcing steel dowels, waterstops, waterproofing bands, joint seals, anchor bolts, enclosures, heating, cooling, curing, finishing, edges and associated works, excluding miscellaneous metal work.

.2 includes cut-off wall and log lifter parking supports.

.3 Payment per cubic meter of concrete actually poured.

.23 Item No. 20 – Concrete works north retaining wall

.1 This item includes forming, reinforcing steel dowels, waterstops, waterproofing bands, joint seals, anchor bolts, enclosures, heating,

cooling, curing, finishing, edges and associated works, excluding miscellaneous metal work.

.2 Payment per cubic meter of concrete actually poured.

.24 Item No. 21 – Concrete works Sluiceway Apron

.1 This item includes forming, reinforcing steel dowels, waterstops, waterproofing bands, joint seals, anchor bolts, enclosures, heating, cooling, curing, finishing, edges, embedded steel and associated works.

.2 Payment per cubic meter of concrete actually poured.

.25 Item No. 22 – Concrete works Sluiceway Piers

.1 Includes intermediate and abutment piers, as well as concrete bearing pedestals.

.2 This item includes forming, reinforcing steel, dowels, waterstops, waterproofing bands, embedded steel for gains and nosings and bearing devices, enclosures, heating, cooling, curing, finishing, edges, second stage concrete, and all associated works.

.3 Payment Per pier.

.26 Item No. 23 – Concrete works Sluiceway Sills and

.1 This item includes forming, reinforcing steel, dowels, waterstops, waterproofing bands, embedded parts of sill beams, sill beams, enclosures, heating, cooling, curing, finishing, edges, second stage concrete, and all associated works.

.2 Payment Per Sluice Sill.

.27 Item No. 24 – Prefab Concrete deck

.1 Includes design, fabrication, supply, installation of precast deck slabs, joints and bearing devices.

.2 This item includes forming, reinforcing steel, embedded steel parts, finishing, joints, anchor bolts, bearing devices, and all associated works.

.3 Payment Per Sluice Deck installed on the dam.

.28 Item No. 25 – Erosion protection

.1 Supply and installation of materials for Erosion Protection Upstream and Downstream - Rip-rap shall be paid by the ton actually installed.

.29 Item No. 26 – Stop log pinning system

.1 Design, fabrication, coating delivery to site when required and installation.

.2 Payment Per unit installed.

.30 Item No. 27 – Gain covers

.1 This item includes design, fabrication, coating delivery to site when required and installation.
.2 Payment Per unit installed.

.31 Item No. 28 – Wooden stop logs
.1 Design, fabrication, delivery to site when required and installation.
.2 Payment Per unit installed.

.32 Item No. 29 – Rails
.1 This item includes design, fabrication, supply and installation, including alignment and anchoring.
.2 Excludes rail temporary rail extensions.
.3 Payment per linear meter installed. 80% installation, 20% commissioning.

.33 Item No. 30 – Safety boom
.1 This item includes design, fabrication, supply, preliminary installation, and final installation, including in-water and shore anchors.
.2 Payment per linear meter of safety boom: 90% temporary installation, 10% final installation.

.34 Item No. 31 – Guardrails, ladders and gates
.1 This item includes design, fabrication, coating, supply, and installation.
.2 Payment Per meter of installed guardrails, gate and ladder measured on the horizontal plane.

.35 Item No. 32 – Backfilling and grading
.1 This item includes backfilling of excavated for construction of the permanent works, construction of north access backfill, driving surface, driving surface foundation, parking lot. It excludes topsoil for reinstatement.
.2 Payment Per sluice: 5% initial activity, 30% dewatering, 45% demolition and construction activity, 20% commissioning.

.36 Item No. 33 – Dam Safety signage large signs
.1 Includes design, fabrication, coating, delivery, and installation.
.2 Payment Per installed 1220x1830 mm and larger signs.

.37 Item No. 34 – Dam Safety signage small signs
.1 Includes design, fabrication, coating, delivery, and installation.
.2 Payment Per installed signs smaller than: 1220x1830 mm.

.38 Item No. 35 – Drilling for grouting (new dam rock injection)

.1 Exclude any works other than new dam rock injection, anchors, dowels, rock excavation. Grouting of cofferdams or any other drilling.
.2 Refer to section 31 32 23 – foundation grouting.
.3 Payment Per meter drilled for rock grouting.

.39 Item No. 36 – Dry cement (new dam rock injection)
.1 Exclude any works other than new dam rock injection).
.2 Refer to section 31 32 23 – foundation grouting.
.3 Payment Per cubic meter of dry cement.

.40 Item No. 37 – Successful grouting stage (new dam rock injection)
.1 Exclude any works other than new dam rock injection).
.2 Refer to section 31 32 23 – foundation grouting.
.3 Payment Per successful grouting stage.

.41 Item No. 38 – Water test (new dam rock injection)
.1 Exclude any works other than new dam rock injection).
.2 Refer to section 31 32 23 – foundation grouting.

.42 Item No. 39 – Admixture for grouting (new dam rock injection)
.1 Exclude any works other than new dam rock injection).
.2 Refer to section 31 32 23 – foundation grouting.
.3 Payment based on admixture invoicing + 15%, upset limit of $10 000.

.43 Item No. 40 – Site restauration and landscaping
.1 Site restoration within the footprint of PCA property including roadway area, parking lot, vegetalized areas.
.2 This includes topsoil, compost and all seeding and planting as well as shore reconstruction.
.3 This excludes restoration of in-water area, demolition area of existing dam, off-site and leased lands.
.4 Payment per square meter of restored area.

.44 Item No. 41 – Dewatering standby rate
.1 Excluding standby caused by Contractor or deficient work planning and environmental mitigation, failure to operate lower logs, etc.
.2 Payment Per day.

.45 Item No. 42 – Phase 1 standby rate
.1 Excluding standby caused by Contractor or deficient work planning and environmental mitigation, failure to operate lower logs, etc.
.2 Payment Per day.

.46 Item No. 43 – Phase 2 standby rate
- .1 Excluding standby caused by Contractor or deficient work planning and environmental mitigation, failure to operate lower logs, etc.
- .2 Payment Per day.

.47 Item No. 44 – Phase 3 standby rate
- .1 Excluding standby caused by Contractor or deficient work planning and environmental mitigation, failure to operate lower logs, etc.
- .2 Payment Per day.

1.5 PREPARING SCHEDULE OF UNIT PRICE TABLE ITEMS

.1 Submit separate schedule of unit price items of Work requested in Bid form.

.2 Make form of submittal parallel to Schedule of Values, with each line item identified same as line item in Schedule of Values. Include in unit prices only:
- .1 Cost of material.
- .2 Delivery and unloading at site.
- .3 Sales taxes.
- .4 Installation, overhead and profit.

.3 Ensure unit prices multiplied by quantities given equal material cost of that item in Schedule of Values.

1.6 PROGRESS PAYMENT

.1 The Departmental Representative will review the draft progress payment format/breakdown to ensure alignment to the Basis of Payment. Should an amendment be required, the Contractor must revise the draft progress payment to the approval of the Departmental Representative.

.2 Draft applications for payment are to be submitted to the Departmental Representative for review and approval. If the Departmental Representative amends application, the Departmental Representative will give notification in writing giving reasons for amendment.

1.7 SUBSTANTIAL PERFORMANCE OF WORK

.1 Prepare and submit to Departmental Representative comprehensive list of items to be completed or corrected and apply for a review by Departmental Representative to establish Substantial Performance of Work. Failure to include items on list does not alter responsibility to complete Contract.

.2 No later than 10 days after receipt of list and application, Departmental Representative will review Work to verify validity of application, and no later than 7 days after completing review, will notify Contractor if Work or designated portion of Work is substantially performed.

.3 Departmental Representative: state date of certificate of Substantial Performance or designated portion of Work in certificate.

.4 Immediately following issuance of certificate of Substantial Performance, in consultation with Departmental Representative, establish a reasonable date for finishing Work.

1.8 FINAL PAYMENT

.1 Submit application for final payment when Work is completed.

.2 Departmental Representative will, no later than 10 days after receipt of application for final payment, review Work to verify validity of application. Departmental Representative will give notification that application is valid or give reasons why it is not valid, no later than 7 days after reviewing Work.

.3 Departmental Representative will issue final certificate for payment when application for final payment is found valid.

END OF SECTION

PART 1 - GENERAL

1.1 MEASUREMENT AND PAYMENT

.1 No separate measurement for payment shall be made for items under this section. Include cost in the contract Lump Sum Amount.

.2 Payments related to this Section shall be as set out in Section 01 22 01 – Measurement and Payment.

1.2 ADMINISTRATIVE

.1 Departmental representative will schedule and administer project meetings at bi-weekly intervals throughout the progress of the work and at the call of Departmental Representative.

.2 Departmental representative will prepare agenda for meetings.

.3 Departmental representative will Distribute written notice of each meeting five days in advance of meeting date to Departmental Representative.

.4 Provide physical space and make arrangements for meetings to accommodate a minimum of 12 people.

.5 Departmental representative will preside at meetings.

.6 Departmental representative will record the meeting minutes. Include significant proceedings and decisions. Identify actions by parties.

.7 Departmental representative will reproduce and distribute copies of minutes within three days after meetings and transmit to meeting participants, Departmental Representative and affected parties not in attendance.

.8 Representative of Contractor, Subcontractors and suppliers attending meetings shall be qualified and authorized to act on behalf of party each represents.

1.3 PRECONSTRUCTION MEETING

.1 Within 15 days after award of Contract, request a “Kick Off” meeting of parties in Contract to discuss and resolve administrative procedures and responsibilities, including establishing a communication protocol.

.2 Departmental Representative, Contractor, major Subcontractors, Environmental Assessment Officer, field inspectors and supervisors and health and safety officers will be in attendance.

.3 Establish time and location of meeting and notify parties concerned minimum 5 days before meeting.

.4 Agenda to include, but not limited to:

- .1 Appointment of official representatives and their backups of participants in the Work.
- .2 Schedule of Work: in accordance with Section 01 32 16 - CONSTRUCTION PROGRESS SCHEDULE.
- .3 Schedule of submission of shop drawings, samples, etc. Submit submittals in accordance with Section 01 33 00 - SUBMITTAL PROCEDURES.
- .4 Requirements for temporary facilities, site sign, offices, storage sheds, portable toilets, utilities, fences in accordance with Section 01 52 00 - CONSTRUCTION FACILITIES.
- .5 Schedule of submission of the site specific Health and Safety Plan, in accordance with Section 01 35 29.06 - HEALTH AND SAFETY REQUIREMENTS and site specific Environmental Management Plan, in accordance with Section 01 35 43 - ARCHEOLOGICAL, CULTURAL AND ENVIRONMENTAL PROCEDURES.
- .6 Delivery schedule of specified equipment in accordance with Section 01 32 16 - CONSTRUCTION PROGRESS SCHEDULES.
- .7 Site security in accordance with Section 01 56 00 - TEMPORARY BARRIERS AND ENCLOSURES.
- .8 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.
- .9 Owner provided products.
- .10 Sources of materials.
- .11 Traffic control, in accordance with Section 01 55 26 - TRAFFIC CONTROL.
- .12 Record drawings in accordance with Section 01 33 00 - SUBMITTAL PROCEDURES and Section 01 78 00 - CLOSEOUT SUBMITTALS.
- .13 Emergency Contacts.
- .14 Take-over procedures, maintenance manual, acceptance, warranties in accordance with Section 01 78 00 - CLOSEOUT SUBMITTALS.
- .15 Monthly progress claims, administrative procedures, photographs, hold backs.
- .16 Appointment of inspection and testing agencies or firms.
- .17 Subcontractors and suppliers.
- .18 Quality Control/Quality Assurance.
- .19 Insurances, transcript of policies.

1.4 PROGRESS MEETINGS

.1 During course of Work and two weeks prior to project completion, schedule progress meetings on bi-weekly basis.

.2 Contractor, major Subcontractors involved in Work, Departmental Representative and PCA Representative are to be in attendance.

.3 Notify parties minimum 5 days prior to meetings.

.4 Record minutes of meetings and circulate to attending parties and affected parties not in attendance within 3 days after meeting.

.5 Agenda to include the following:
- .1 Review, approval of minutes of previous meeting.
- .2 Review of Work progress since previous meeting.
- .3 Problem which impede construction schedule.
- .4 Health and Safety issues and concerns.
- .5 Environmental Protection issues and concerns.
- .6 Water control and dewatering operations.
- .7 Field observations, including monitoring reports, problems or conflicts.
- .8 Review of off-site fabrication delivery schedules.
- .9 Corrective measures and procedures to regain projected schedule.
- .10 Status of submittals.
- .11 Revision to construction schedule.
- .12 Progress schedule, during succeeding work period.
- .13 Review submittal schedules: expedite as required.
- .14 Maintenance of quality standards.
- .15 Review proposed changes for effect on construction schedule and on completion date.
- .16 Other business.

PART 2 - PRODUCT

2.1 NOT USED

.1 Not used

PART 3 - EXECUTION

3.1 NOT USED

.1 Not used

END OF SECTION

PART 1 - GENERAL

1.1 MEASUREMENT AND PAYMENT

.1 No separate measurement for payment shall be made for items under this section. Include cost in the contract Lump Sum Amount.

.2 Payments related to this Section shall be as set out in Section 01 22 01 – Measurement and Payment.

1.2 ELECTRONIC PHOTOGRAPHS

.1 Submit electronic copy of colour digital photographs in jpg or tiff format with monthly progress statement as directed by Departmental Representative.

.2 Camera to have a rating of 12 Megapixels and set at high resolution.

.3 Project identification: name and number of project and date of exposure indicated in filename.

.4 Photographs to be indicative of extent of ongoing work and outstanding events or items

.5 Number of viewpoints: ten (10) viewpoint of work area and two (2) at each staging area and at key elements of the work progress as determined by Departmental Representative. Provide viewpoint location plan where requested by the Departmental Representative.

.6 Frequency: take weekly photographs and submit monthly with progress statement as directed by Departmental Representative. During periods of inactivity at work site, take photographs bi-weekly at the same viewpoints. At project closeout, provide electronic file of all compiled referenced photographs.
.1 Increase frequency to document notable events

.7 Parks Canada Agency reserves the right to install cameras on sites for monitoring of construction progress and environmental controls. Operation of cameras and their photos is in full compliance with the Privacy Act. The Contractor shall not take exception to these cameras.

1.3 Drone footage

.1 Contractor to take drone footage and photographs in high resolution covering entire worksite.

.2 Drone to footage to be take every 2 month and at notable events in construction.

1.4 Daily report

.1 Submit daily progress reports within 24 hours to departmental representative. Reports must include at a minmum:
- .1 Name of project;
- .2 Meteorological conditions and short term forecast;
- .3 Water elevation upstream and downstream of site;
- .4 List of construction activities;
- .5 List of monitoring activities (environment, impacts and structure);
- .6 Turbidity and Ph readings;
- .7 Outstanding reviews by departmental representative;
- .8 Health and safety statistics;
- .9 Contractor and subcontractors on site;
- .10 List of on-site personnel and machinery;
- .11 List of materials delivered on site;
- .12 Notable events.

PART 2 - PRODUCT

2.1 NOT USED

.1 Not used

PART 3 - EXECUTION

3.1 NOT USED

.1 Not used

END OF SECTION

PART 1 - GENERAL

1.1 DEFINITIONS

.1 Activity: element of Work performed during course of Project. Activity normally has expected duration, and expected cost and expected resource requirements. Activities can be subdivided into tasks.

.2 Bar Chart (GANTT Chart showing the critical path in MS Project): graphic display of schedule-related information. In typical bar chart, activities or other Project elements are listed down left side of chart, dates are shown across top, and activity durations are shown as date-placed horizontal bars.

.3 Baseline: original approved plan (for project, work package, or activity), plus or minus approved scope changes.

.4 Duration: number of work periods (not including holidays or other nonworking periods) required to complete activity or other project element. Usually expressed as workdays or workweeks.

.5 Master Plan: summary-level schedule that identifies major activities and key milestones.

.6 Milestone: significant event in project, usually completion of major deliverable.

.7 Project Schedule: planned dates for performing activities and the planned dates for meeting milestones. Dynamic, detailed record of tasks or activities that must be accomplished to satisfy Project objectives with a narration of assumptions on the Schedule. Monitoring and control process involves using Project Schedule in executing and controlling activities and is used as basis for decision making throughout project life cycle.

.8 Project Planning, Monitoring and Control System: overall system operated by Departmental Representative to enable monitoring of project work in relation to established milestones.

1.2 MEASUREMENT AND PAYMENT

.1 No separate measurement for payment shall be made for items under this section. Include cost in the contract Lump Sum Amount.

.2 Payments related to this Section shall be as set out in Section 01 22 01 – Measurement and Payment.

1.3 REQUIREMENTS

.1 Ensure Master Plan and Detail Schedules are practical and remain within specified Contract duration.

.2 Plan to complete Work in accordance with prescribed milestones and time frame.

.3 Carry out the work during "regular hours" from Monday to Friday between 7:00 and 17:00 hours, unless otherwise noted and approved in writing by the Departmental Representative. Therefore, provide five day work week and define schedule calendar working days as part of Bar (GANTT) Chart submission.

.4 When possible, limit activity durations to maximum of approximately ten (10) working days, to allow for progress reporting.

.5 Make allowance for obtaining regulatory permits, other agency approvals, obtaining additional lands for staging areas and accesses, receiving permission to temporarily relocate utilities as well as preparation, review and approval of various submittals such as Environmental Management Plan, Waste Reduction Work Plan, Health and Safety Plan, etc.

.6 Project milestones form interim targets for Project Schedule.

.1 Due to the fish spawning season in water work is not allowed between March 15th and July 15th. As such, the Contractor cannot build or remove cofferdams or perform other work in the waterway within this period. This restriction also applies to any work involving movement of equipment in the water during this period.

.7 Due to the migratory bird nesting season, no tree cutting will be allowed between April 1st and August 31st.

.8 Start of drawdown to winter water levels normally occurs the week following the navigation closure. The Trent-Severn Waterway does not have an exact date when the water levels are raised back to the navigation levels, as the spring run-off depends on the snowfall and spring weather for that particular year. As a practice the navigation water levels are typical restored by the end of April. Typical winter drawdown is in the order of 0 to 600 mm.

.9 Trent-Severn Waterway navigation season and hours of operation:
.1 Navigation season and hours of operation are described in Section 01 14 00 Work Restriction.

.10 Contractor must take these constraints and other constraints mentioned in Section 01 11 00 into considerations while developing the detailed project schedule and must show them as activities in the GANTT chart.

1.4 MASTER PLAN

.1 Structure schedule to allow orderly planning, organizing and execution of Work as Bar Chart (GANTT).

.2 The Departmental Representative will review and return revised schedules in a timely manner.

.3 Revise impractical schedule and resubmit within five (5) working days.

.4 Accepted revised schedule will become Master Plan and be used as baseline for updates.

1.5 PROJECT SCHEDULE

.1 Develop detailed Project Schedule derived from Master Plan.

.2 Issue of Historic Canal Regulations Permit that is required before commencement of work will follow the:
.1 Submission and approval of site specific Health and Safety Plan;
.2 Submission and approval of site specific Environmental Management Plan;
.3 Submission and approval of Dewatering Plan;
.4 Submission and approval of Site Layout Plan;

.3 Ensure detailed Project Schedule includes as minimum milestone and activity types as follows:
.1 Award;
.2 Shop Drawings and Product Data;
.3 Design submission of the temporary works;
.4 Permits / DFO Approval;
.5 Tree clearing and grubbing;
.6 Mobilization and site camp/staging area preparation;
.7 Environmental controls and mitigation measures;
.8 Site instrumentation / monitoring;
.9 Traffic control;
.10 Water control structures and dewatering in accordance with construction phasing;

.11 Construction of downstream cofferdam including temporary boom, navigation and construction signage in accordance with construction phasing;
.12 Dewatering with environmental control;
.13 Site access;
.14 Salvage of identified items/materials;
.15 Stage 1 - Works on Existing Dam (for each required sluice):
  .1 Voids filling works underneath;
  .2 Dewatering system;
  .3 Sill lowering and temporary gains;
  .4 Lower log operation system;
  .5 Anchoring of dam;
  .6 Installation of upstream boom assembly with anchors.
.16 Stage 2 &3 - Construction of New Dam:
  .1 Construction of tie-in and downstream cofferdams;
  .2 Excavation and demolitions work;.
  .3 Foundation and base preparation.
  .4 Structural concrete of dam apron, sill, piers, slabs, cut-off walls, abutments and retaining walls, gravity dams, including prefabricated concrete items, bearing devices, miscellaneous metals and embedded parts;
  .5 Backfill and erosion control work;
  .6 Installation of handrails, loglifter system, stoplogs, stoplog guide covers, safety signs, gates and rails;
  .7 Installation of dam safety and navigation safety signage;
.17 Installation of upstream boom assembly with anchors at permanent location;
.18 Construction /restoration of public and private roads and driveways;
.19 Removal of cofferdams and all temporary works;
.20 Site restoration including landscaping work;
.21 Restoration of on-site and off-site staging areas including environmental testing as required;
.22 Inspection for completion of all work and issuing of Substantial Certificate of Completion;
.23 Training of PCA operating staff;
.24 Other activities as specified by the Departmental Representative.
.25 Other activities deemed pertinent by the contractor.

.4 Update Project Schedule on bi-weekly basis reflecting activity changes and completions, as well as activities in progress.

.5 Include as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays and impact with possible mitigation.

.6 Submit "3 Weeks Look Ahead Schedule" together with Construction Progress Schedule.

1.6 PROJECT MEETINGS

.1 Discuss Project Schedule at regular site meetings, identify activities that are behind schedule and provide measures to regain slippage. Activities considered behind schedule are those with projected start or completion dates later than current approved dates shown on baseline schedule.

.2 Weather related delays with their remedial measures will be discussed and negotiated.

1.7 PROGRESS PAYMENT REQUEST RELEASE

.1 Project schedule reporting as described above is condition for Progress Payment release by the Departmental Representative. No progress payments will be made until an up-to-date Construction Progress Schedule and 3 Weeks Look Ahead Schedule are received and reviewed by the Departmental Representative.

PART 2 - PRODUCT

2.1 NOT USED

.1 Not used

PART 3 - EXECUTION

3.1 NOT USED

.1 Not used

END OF SECTION

PART 1 - GENERAL

1.1 THIS SECTION INCLUDES

.1 This section specifies general requirements and procedures for contractors' submissions of shop drawings, product data and samples to Departmental Representative for review.

.2 Additional specific requirements for submissions are specified in individual sections of specifications

.3 All submittals must be delivered in accordance with “Doing Business with PWGSC”.

1.2 RELATED REQUIREMENTS

.1 Section 01 78 00 - CLOSEOUT SUBMITTALS.

1.3 MEASUREMENT AND PAYMENT

.1 No separate measurement for payment shall be made for items under this section. Include cost in the contract Lump Sum Amount.

.2 Payments related to this Section shall be as set out in Section 01 22 01 – Measurement and Payment.

1.4 ADMINISTRATIVE

.1 Submit to Departmental Representative submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed. A minimum of up to 15 working days should be allowed for document review by the Departmental Representative.

.2 Do not proceed with Work affected by submittal until review is complete.

.3 Present shop drawings, product data and samples in SI Metric units.

.4 Where items or information is not produced in SI Metric units converted values are acceptable.

.5 Review submittals prior to submission to Departmental Representative. The review must ensure that necessary requirements have been determined and verified, or

will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.

.6 Notify Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.

.7 Verify field measurements and affected adjacent Work are co-ordinated.

.8 Present calculation briefs containing all information required to support detailed design of structures as indicated in these specifications.

.9 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative's review of submittals.

.10 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative review.

.11 Make any and all changes in submittals which the Departmental Representative may require consistent with the Contract Documents and resubmit as directed by the Departmental Representative.

.12 Notify the Departmental Representative, in writing, when resubmitting any revisions other than those requested by the Departmental Representative.

.13 Keep one reviewed copy of each submission on site.

1.5 MEASURE OF PAYMENT

.1 Payment of this Section shall be as set out in Section 01 22 01 – Measurement and Payment.

1.6 SHOP DRAWINGS AND PRODUCT DATA

.1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.

.2 Submit drawings stamped and signed by professional engineer registered or licensed in the Province of Ontario, Canada.

.3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.

.4 Allow fifteen (15) working days for Departmental Representative's review of each submission.

.5 Adjustments made on shop drawings by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.

.6 Make changes to shop drawings as Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of revisions other than those requested.

.7 Accompany submissions with transmittal letter, containing:
- .1 Date.
- .2 Project title and number.
- .3 Contractor's name and address.
- .4 Identification and quantity of each shop drawing, product data and sample.
- .5 Other pertinent data.

.8 Submittals shall include:
- .1 Date and revision dates.
- .2 Project title and number.
- .3 Name and address of:
  - .1 Subcontractor.
  - .2 Supplier.
  - .3 Manufacturer.
- .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents. Note: submittals without a signed Contractor’s stamp will not be reviewed and will be returned to the Contractor for re-submittal with the required signed stamp.
- .5 Details of design, installation, performance verification and decommissioning of temporary and permanent works, including load bearing structures duly stamped by a professional engineer, licensed to practice in Ontario (with Canadian related experience to items of work

being designed) as specified in the respective Sections including:
.1 Design methodology including criteria, assumptions, and standards.
.2 Calculations.
.3 Details.

.6 Details of appropriate portions of Work as applicable:
.1 Fabrication.
.2 Layout, showing dimensions, including identified field dimensions, and clearances.
.3 Setting or erection details.
.4 Capacities.
.5 Performance characteristics.
.6 Standards.
.7 Operating weight.
.8 Relationship to adjacent work.

.9 After Departmental Representative's review, distribute copies to appropriate parties.

.10 Submit one electronic copy of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.

.11 Submit electronic copies of product data sheets or brochures for requirements requested in specification Sections and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.

.12 Submit electronic copies of test reports for requirements requested in specification Sections and as requested by Departmental Representative.
.1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.

.13 Submit electronic copies of certificates for requirements requested in specification Sections and as requested by Departmental Representative.
.1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
.2 Certificates must be dated after award of project contract complete with project name.

.14 Submit electronic copies of manufacturers instructions for requirements requested in specification Sections and as requested by Departmental Representative.

.1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.

.15 Submit electronic copies of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Departmental Representative.

.16 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.

.17 Submit electronic copies of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Departmental Representative.

.18 Delete information not applicable to project.

.19 Supplement standard information to provide details applicable to project.

.20 If upon review by Departmental Representative no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and re-submission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.

.1 Resubmit corrected submittals within 5 business days

.21 The review of shop drawings by Departmental Representative is for sole purpose of ascertaining conformance with general concept.

.1 This review shall not mean that Departmental Representative approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract Documents.

.2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and

installation and for co- ordination of Work of sub-trades.

.22 Submit plans for the following, but not limited to:
- .1 Site specific Health and Safety Plan.
- .2 Site specific Environmental Management Plan. Including, but not limited to the following sub-plans:
  - .1 Tree protection plan
  - .2 Waste reduction workplan.
  - .3 Active nest mitigation plan, if required
  - .4 Surface Water, Erosion and Sediment Management plan.
- .3 Traffic control Plan.
- .4 Dewatering Plan.
- .5 Site Layout Plan.
- .6 Commissioning Plan.
- .7 Site restauration Plan.
- .8 Quality control program.
- .9 Warranty Management plan.

.23 Submit shop drawings for the following work, but not limited to:
- .1 Reinforcing steel.
- .2 Metal fabrication railings, covers, embedded steel, etc…)
- .3 Prefabricated concrete decks.
- .4 Mechanical equipment.
- .5 Stop log gantry crane
- .6 Stop logs.
- .7 Steel stop logs.
- .8 Public Safety Signage.
- .9 Safety Booms and their anchors.
- .10 Water control structures and dewatering.
- .11 Other items identified in the specifications not mentioned in this list.

.24 Submit product data for all the supply items but not limited to the following:
- .1 Concrete mixes.
- .2 Waterstops.
- .3 Aggregates and soils.
- .4 Plants and seeds.
- .5 Anchors and anchor grout.
- .6 Handrails.
- .7 Painting materials.
- .8 Geotextile.
- .9 Mechanical lifting equipment.
- .10 Any other items as specified by the Departmental Representative and/or the specifications

1.7 SAMPLES

.1 Sample: examples of materials, equipment, quality, finishes, workmanship, etc.

.2 Submit for review samples as requested in respective specification Sections. Label samples with origin and intended use.

.3 Deliver samples prepaid to Departmental Representative's site office.

.4 Notify Departmental Representative in writing, at time of submission of deviations in samples from requirements of Contract Documents.

.5 Where colour, pattern or texture is criterion, submit full range of samples.

.6 Adjustments made on samples by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state so in writing to Departmental Representative prior to proceeding with Work.

.7 Make changes in samples which Departmental Representative may require, consistent with Contract Documents.

.8 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.8 SUBMITAL SCHEDULE

.1 Submittals to be provided sufficiently in advance to allow review by departmental representative and eventual correction prior to commencement of works linked to the submittals as identified in updated project schedule. Unless otherwise noted in the pertinent sections, abide with the following schedule
- .1 Product sheets: 20 work days prior to product use.
- .2 Samples: 30 work days prior to installation or product use.
- .3 Shop drawings: 30 work days prior to commencement of fabrication.
- .4 Plans: 40 work days prior to plan implementation.
- .5 Qualifications: 30 work days prior to work, installation or product use.
- .6 Inspection and test Results: within 5 days of inspection/testing.

.2 If pertinent work starts less than the indicated period after Contract Award, submit documentation within 10 days of Contract Award.

.3 if samples, shop drawings, product sheets, qualifications, inspections, plans, and other

submittals are not submitted by the contractor within the appropriate timelines, any delays/costs incurred as a result will be absorbed/borne by the Contractor

PART 2 - PRODUCT

2.1 NOT USED

.1 Not used

PART 3 - EXECUTION

3.1 NOT USED

.1 Not used

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 This section covers work related to traffic control and safety, and traffic detours in and around the work area.

1.2 REFERENCE STANDARDS

.1 Ontario Ministry of Transportation, Ontario Traffic Manual, Book 7 - Temporary Conditions - 2014 (OTM - Book 7).

1.3 MEASUREMENT AND PAYMENT PROCEDURES

.1 There shall be no separate measurement for payment for the work under this Section. Include costs in the contract Lump Sum Amount.

.2 Payment shall be made as set out in Section 01 22 01 and shall be included in the applicable item of work

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00- Submittal Procedures.

.2 Submit Traffic Control Plan (TCP) to the Departmental Representative and local authorities within 10 days of contract award, signed and sealed by a Professional Engineer, licensed in the Province of Ontario.

.3 Provide a construction Traffic Control Plan for both work related and local traffic detour to the Ontario Traffic Manual requirements, and to the governing authorities and Departmental Representative.

.4 Traffic Control Plan to include permits, notification of emergency services and local school boards regarding road closures and detours

.5 Traffic Plans need to be approved by the local Authorities prior to any road and lane closure, and accepted by the Departmental Representative.

.6 Develop, as part of the TCP, an emergency and incident management traffic control plan which facilitates emergency vehicle access to work zone locations.

.7 Obtain the necessary approvals and permits from the road authority.

1.5 PROTECTION OF PUBLIC TRAFFIC

.1 When working on travelled way:
- .1 Place equipment in position to present minimum of interference and hazard to travelling public.
- .2 Keep equipment units as close together as working conditions permit and preferably on same side of travelled way.
- .3 Do not leave equipment on travelled way overnight.
- .4 Do not close road or any lanes of road without approval of Departmental Representative and local authorities.
- .5 Before re-routing traffic erect suitable signs and devices in accordance with instructions contained in the OTM - Book 7, and in accordance with the local Authorities requirements.
- .6 Road closure notice signs are to be erected four weeks in advance.
- .7 Notice and traffic control signage are to be in both official languages.
- .8 Provide and maintain road access and egress to local properties, unless other means of road access exist that meets the approval of Departmental Representative and local Authorities.
- .9 Where detours are to be constructed for public usage, construct roads to the requirements of the local Authorities

.2 Keep travelled way graded, free from pot holes and of sufficient width for required number of lanes of traffic.
- .1 Provide 7 m wide minimum temporary roadway for traffic in two-way sections through Work and on detours.
- .2 Provide 5 m wide minimum temporary roadway for traffic in one-way sections through Work and on detours.

1.6 INFORMATIONAL AND WARNING DEVICES

.1 Provide and maintain signs, flashing warning lights and other devices required to indicate construction activities, detour or other temporary and unusual conditions resulting from Project Work which requires road user response.

.2 Supply and erect signs, delineators, barricades and miscellaneous warning devices as specified in the OTM - Book 7.

.3 Place signs and other devices in locations recommended in Ontario Traffic Manual, Book 7.

.4 Meet with Departmental Representative prior to commencement of Work to prepare list of signs and other devices required for project. If situation on site changes, revise list and resubmit for approval by the Departmental Representative and local authorities.

.5 Continually maintain traffic control devices in use by:

.1 Checking signs daily for legibility, damage, suitability and location. Clean, repair or replace to ensure clarity and reflectance.
.2 Removing or covering signs which do not apply to conditions existing from day to day.

1.7 CONTROL OF PUBLIC TRAFFIC

.1 Provide competent flag persons, trained in accordance with, and properly equipped as specified in, OTM - Book 7 in the following situations:

.1 When public traffic is required to pass working vehicles or equipment that block all or part of travelled roadway.
.2 When it is necessary to institute one-way traffic system through construction area or other blockage where traffic volumes are heavy, approach speeds are high and traffic signal system is not in use.
.3 When workmen or equipment are employed on travelled way over brow of hills, around sharp curves or at other locations where oncoming traffic would not otherwise have adequate warning.
.4 Where temporary protection is required while other traffic control devices are being erected or taken down.
.5 For emergency protection when other traffic control devices are not readily available.
.6 In situations where complete protection for workers, working equipment and public traffic is not provided by other traffic control devices.

1.8 OPERATIONAL REQUIREMENTS

.1 Maintain existing conditions for traffic throughout period of contract except that, when required for construction under contract and when measures have been taken as specified and accepted by Departmental Representative and the local Authorities to protect and control public traffic.

1.9 DETOUR AND TRAFFIC PLAN

.1 Provide a construction Traffic Control Plan for both work related and local traffic detour to the Ontario Traffic Manual Book 7 requirements, and to the governing authorities, Agency and Departmental Representative.

.2 Traffic Control Plan to include permits, notification of emergency services and local school boards regarding road closures and detours.

.3 Traffic Plans need to be approved by the local Authorities prior to any road closure.

1.10 MARINE TRAFFIC

.1 In case of works in water or near water and where applicable during the navigation season, the Contractor shall provide in the Traffic Management Plan detailed traffic control measures for managing marine traffic for the duration of the project. The Contractor is solely responsible for managing such traffic control including buoys and signaling or any other traffic control measures, as required by PCA's Operation Standards. The Contractor shall make available a competent person responsible for ensuring compliance of marine traffic control measures at all times.

PART 2 - PRODUCT

2.1 NOT USED

.1 Not used

PART 3 - EXECUTION

3.1 NOT USED

.1 Not used

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 Canadian Standards Association (CSA): Canada
  .1 CSA S350-M1980 (R2003), Code of Practice for Safety in Demolition of Structures.
  .2 CSA Z275.2:20, Occupational safety code for diving operations

.2 Canadian Association of Diving Contractors, October 2011, Guidelines for Diving Operations on Dams and other Worksites where Delta-P Hazards may exist.

.3 National Building Code 2015 (NBC):
  .1 NBC 2015, Division B, Part 8 Safety Measures at Construction and Demolition Sites.

.4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  .1 Safety Data Sheets (SDS)

.5 Province of Ontario
  .1 Occupational Health and Safety Act, R.S.O. 1990, c.0.1, current edition.
  .2 Regulations for Construction Projects, O. Reg. 213/91, current edition.
  .3 Diving Operations, O. Reg. 629/94, current edition:
  .4 Workplace Safety and Insurance Act, 1997.
  .5 Municipal Statutes and Authorities.

1.2 MEASUREMENT AND PAYMENT

.1 No separate measurement for payment shall be made for items under this section. Include cost in the contract Lump Sum Amount.

.2 Payments related to this Section shall be as set out in Section 01 22 01 – Measurement and Payment.

1.3 SUBMITTALS

.1 Submit site-specific Health and Safety Plan and Fire Safety Plan: Within 5 days after date of Notice to Proceed and prior to commencement of Work. Site-specific Health and Safety Plan must include:
  .1 Company Health and Safety Policy.
  .2 Description of the Work.
  .3 Results of site specific safety hazard assessment.

.4 Results of safety and health risk or hazard analysis for site tasks and operations.
.5 Measures and controls to be implemented to address identified safety hazards and risks.
.6 Contractor's and Sub-contractor's Safety Communication Plan.
.7 Name and contact information of Health and Safety Co-ordinator.
.8 Contingency and Emergency Response Plan addressing standard operating procedures specific to the project site to be implemented during emergency situations.
.9 Work shall not proceed without Health and Safety Plan.

.2 Submit copies of reports or directions issued by Federal and Provincial health and safety inspectors.

.3 Submit copies of Contractor's work site health and safety inspection reports to Departmental Representative.

.4 Submit copies of incident and accident reports.

.5 Submit WHMIS SDS - Safety Data Sheets for all products and items used on site to the Departmental Representative.

.6 Submit required permits and proof that hazardous materials were disposed off-site in accordance with authority having jurisdiction no later than 5 days after disposal of such materials.

.7 The Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 10 days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within 5 days after receipt of comments from Departmental Representative.

.8 Departmental Representative's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.

.9 Submit names and contact information of personnel and alternates responsible for site safety and health present on site, and use of personal protective equipment.

.10 Medical Surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to

commencement of Work, and submit additional certifications for any new site personnel to the Departmental Representative.

.11 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency operating procedures to be implemented during emergency situations. Supply a 24 hour emergency contact and phone number.

.12 Submit records of Contractor's Health and Safety meetings when requested.

.13 Submit Workplace Safety and Insurance Board (WSIB) - Experience Rating Report for Province of Ontario.

.14 Submit diving plan as per O. Reg. 629/94.

1.4 FILING OF NOTICE

.1 The Contractor will file Notice of Project with Provincial authorities prior to beginning of Work.

.2 Be responsible and assume the Constructor role for each work zone location.

.3 File all other required notices in accordance with Acts and Regulations of Province of Ontario.

.4 Keep copy of Notice of Project on site at all times.

1.5 SAFETY ASSESSMENT

.1 Perform site specific safety hazard assessment related to project.

.2 Inspect equipment prior to delivery to site. If Departmental Representative suspects a defect or accident risk, he may at any time order immediate shutdown of equipment and require proof of certification.

1.6 MEETINGS

.1 Pre-construction meeting: Schedule and administer Health and Safety meeting with the Departmental Representative prior to commencement of Work.

1.7 REGULATORY REQUIREMENTS

.1 Comply with Acts and Regulations of the Province of Ontario.

.2 Comply with specified standards and regulations to ensure safe operations at site.

1.8 PROJECT/SITE CONDITIONS

.1 Work at site will involve contact with, but not limited to:
- .1 Silica in concrete (from concrete demolition/removal).
- .2 Corroded metals.
- .3 Potential lead based paints and/or other designated substances as specified in the Designated Substance Report enclosed.
- .4 Benzene in fuel oil, paints and adhesives.
- .5 Arsenic and acrylonitrile in adhesives.
- .6 Herbicides.
- .7 Cementitious products such as fresh concrete and grout, concrete admixtures and bonding agents.

.2 Hazards on-site include but are not limited to:
- .1 Working around moving equipment.
- .2 Working at heights
- .3 Working near excavations and heavy machinery.
- .4 Working in water.
- .5 Work near water.
- .6 Working under water.
- .7 Wildlife including Mississauga Rattle Snakes (venomous) and bears.
- .8 Icy surfaces.
- .9 Confined spaces.
- .10 Working during cold and adverse weather conditions including extreme temperatures.
- .11 Areas with lack of a system/anchor point for the workers to tie themselves off while working.
- .12 Remote location, far away from emergency services/hospital.
- .13 Working near power lines.
- .14 Tree cutting and grubbing.

1.9 GENERAL REQUIREMENTS

.1 Comply with Ontario Occupational Health and Safety Act.

.2 Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.

.3 Site specific Health and Safety Plan covers sub-trades utilized on the project.

.4 Departmental Representative may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns either accepting or requesting improvements.

1.10 COMPLIANCE REQUIREMENTS

.1 Comply with Ontario Occupational Health and Safety Act, R.S.O. 1990 Chapter 0.1, as amended.

1.11 RESPONSIBILITY

.1 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.

.2 Where applicable, the Contractor will be responsible and assume the role of "Constructor" as described in the Ontario Occupational Health and Safety Act and Regulations for Construction Projects.

.3 Ensure a clear delineation in time and space between Parks Canada staff and Contractor's own forces such that Contractor maintains designation as "Constructor" as defined by the Occupational Health and Safety Act for the Province of Ontario.

.4 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable Federal, Provincial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

.5 Be responsible to set up and keep up-to-date an Emergency Response Plan for Work that includes:
- .1 Description of major disaster risks (hazardous material spills, work near water, etc.).
- .2 Evacuation Procedure.
- .3 Identification of resources (police, firefighters, ambulance services, etc.).
- .4 Identification of persons in charge at the site.
- .5 Identification of those with first-aid training.
- .6 Training required for personnel applying the plan.
- .7 Other information needed, based on site characteristics.

1.12 UNFORSEEN HAZARDS

.1 When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work,

immediately stop work and advise Departmental Representative verbally and in writing.

.2 Follow procedures in place for Employees Right to Refuse Work as specified in the Occupational Health and Safety Act for the Province of Ontario.

1.13 HEALTH AND SAFETY CO-ORDINATOR

.1 Employ and assign to Work, competent and authorized representative as Health and Safety Co-ordinator. Health and Safety Co-ordinator must:
- .1 Have site-related working experience specific to activities associated with heavy machinery, demolition, soil and concrete excavation, backfilling, concrete forming and placement, tree clearing and grubbing, etc.
- .2 Have working knowledge of occupational safety and health regulations.
- .3 Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform Work.
- .4 Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan.
- .5 Be on site during execution of Work and report directly to and be under direction of site supervisor.
- .6 Be responsible for competency/training cards.

1.14 POSTING OF DOCUMENTS

.1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Province of Ontario, and in consultation with the Departmental Representative.

.2 Provide documents as follows and post on site:
- .1 Contractor's Health and Safety Policy.
- .2 Contractor's Name.
- .3 Notice of Project.
- .4 Name, trade, and employer of Health and Safety Coordinator.
- .5 Ministry of Labour Orders and reports.
- .6 Occupational Health and Safety Act and Regulations for Construction Projects for Province of Ontario.
- .7 Address and phone number of nearest Ministry of Labour office.
- .8 Material Safety Data Sheets.
- .9 Written Emergency Response Plan.

.10 Site Specific Health and Safety Plan.
.11 Valid certificate of first-aid personnel on duty.
.12 WSIB "In Case of Injury at Work" poster.
.13 Location of toilet and cleanup facilities.
.14 Special site-specific handling or operational procedures.

.3 Comply with Provincial general posting requirements.

1.15 CORRECTION OF NON-COMPLIANCE

.1 Immediately address health and safety non-compliance issues (including "near misses") identified by authority having jurisdiction or by Departmental Representative.

.2 Provide Departmental Representative with written report of action taken to correct non-compliance of health and safety issues identified.

.3 The Departmental Representative may stop Work if non-compliance of health and safety regulations is not corrected.

1.16 BLASTING

.1 No blasting or use of explosives is allowed at the construction site.

1.17 WORK STOPPAGE

.1 Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work.

.2 Assign responsibility and obligation to the Competent Supervisor to stop or start work when at his/her discretion, it is necessary or advisable for reasons of health or safety. The Departmental Representative may also stop work for health and safety considerations.

.3 The Departmental Representative may issue a stop-work notice in instances of non-compliance with prescribed environmental mitigation measures and conditions as well as the site specific Environmental Management Plan (EMP).

1.18 EQUIPMENT LOCK-OUT/TAG-OUT

.1 Coordinate and comply with multi lock lock-out/tag-out procedures for electrical and mechanical equipment on-site.

1.19 DIVING REQUIREMENTS

.1 Diving must be in compliance with O. Reg. 629/94: diving operations and CSA Z275.2:20 as well as Canadian association of Diving Contractors (CADC) Guidelines for Diving Operations on Dams and other Worksites where Delta-P Hazards may exist.

PART 2 - PRODUCT

2.1 NOT USED

.1 Not used

PART 3 - EXECUTION

3.1 NOT USED

.1 Not used

END OF SECTION

PART 1 - GENERAL

1.1 MEASUREMENT AND PAYMENT

.1 No separate measurement for payment shall be made for items under this section. Include cost in the contract Lump Sum Amount.

.2 Payments related to this Section shall be as set out in Section 01 22 01 – Measurement and Payment.

1.2 DESCRIPTION

.1 This Section describes requirements for protection of archeological and cultural resources and the valued environmental components (VECs) that apply to the Work. These requirements apply to all Sections of these Specifications, without limiting the conditions and approvals imposed by statute.

.2 Control work to provide effective archeological, cultural, environmental, waterway and fish habitat protection. Departmental Representative will monitor mitigation measures and will identify whenever such measures are found to be ineffective. Change protective measures or work procedures as directed by Departmental Representative.

.3 Change to more stringent protective measures or work procedures as necessary to ensure environmental, heritage, waterway and fish habitat protection.

.4 A DIA mitigation measure (DIA) has been provided to the Contractor by the departmental representative as part of the contract documents. It is intended to be prescriptive in nature and govern/establish the minimum performance expectations for the execution of the work. The Contractor must accept the mitigation measure assessment and provide its Site-specific Environmental management protection plan (SSEMPP and required appendices specifying how the work is to be executed in conformance with it.

.5 Meet or exceed the requirements of all environmental legislation or regulations, including all amendments up to the project date provided that in any case of conflict or discrepancy the more stringent requirements shall apply. The following apply;

.1 Historic Canals Regulations, SOR/93-220, Department of Transport Act, May 1993.

.2 Environmental Protection Act, Province of Ontario, R.S.O., 1990.

.3 Fisheries Act (R.S.C., 1985, c. F-14, s.1);
.4 Species at Risk Act Section 73.
.5 Migratory Birds Convention Act (S.C. 1994 c.22), Section 5.
.6 Navigation Protection Act; (R.S.C. 1985, c. N-22, c. 31, s. 316) Section 5(1) (Part 2- Item 43)
.7 Ontario Water Resources Act, Province of Ontario, R.S.O, 1990.
.8 Ontario Provincial Standard Specification OPSS.MUNI 805, November 2018, Construction Specification for Temporary Erosion and Sediment Control Measures.
.9 Historic Canal Regulations (HCR) apply to and govern work under this Contract. Regulations may be obtained from Justice Canada's website at: http://laws- lois.justice.gc.ca/eng/regulations

.6 DIA Mitigation Measure (DIA) with associated environmental mitigation measures are found in attached contract appendices. Contractor must accept comply and meet stated measures.

.7 Changes not addressed by DIA and SSEMPP will require additional mitigation measures to be approved by Departmental Representative and integrated in SSEMP. The SSEMP is a living document and may from time to time be updated to reflect changes in the nature of work. The Contractor is required to update the Environmental Management and Protection plan to reflect these changes, at no additional cost.

.8 Comply with environmental requirements of the Contract Documents, the Environmental Management Plan (EMP) and the DIA Mitigation Measure (DIA)) completed for the project, as well as with applicable Federal, Provincial and local statutes, Acts, regulations and ordinances of Agencies having jurisdiction. As per Section 5.1.4, the Roles and Responsibilities of the Environmental Management Team of PCA’s Environmental Standards and Guidelines (ESG) document, Contractor shall make allowance for a qualified professional who is responsible, on a full-time basis, for the ongoing implementation, maintenance, performance monitoring, continuous improvement and compliance of all aspects of the Site Specific Environmental Management and protection Plan, DIA and the ESG throughout the life of the project. This qualified professional shall work on behalf of the Contractor having authority over the construction site. The qualified professional shall form part of the Contractor’s on-site organization.

1.3 DEFINITIONS

.1 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humans; or degrade environment aesthetically, culturally and/or historically.

.2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction. Control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous and liquid waste; radiant energy and radioactive material as well as other pollutants.

.3 Deleterious Material: any substance that, if added to a waterbody, could degrade water quality or impact fish, fish habitat or aquatic wildlife. This includes, but is not limited to:
- .1 Concrete dust.
- .2 Soils (clay, silt, sand).
- .3 Oil, diesel or gasoline.
- .4 Chipped or fresh mortar, concrete and admixtures.
- .5 Alkali water resulting from fresh concrete or cementitious grout.
- .6 Salt.
- .7 Solvents.
- .8 Grout.
- .9 Paint.
- .10 Lead.

.4 Dripline: designates the location on the ground surface directly beneath a theoretical line described by the tips of the outermost branches of the trees.

.5 Barrier: fence consisting of approved material, supported by steel posts and being a minimum of 1.8 m high, without breaks or unsupported sections.

.6 Designated Substances: Hazardous materials as defined and listed on Ontario Regulation 490/09.

.7 Brown Water – water from within the dewatered area that for whatever reason must be treated for turbidity and likely pH prior to its release to the waterway. Brown Water typically results from rainfall or snow melt within the dewatered area, construction water such as demolition dust control, pre-soaking of existing concrete surfaces, green cutting, curing and other related sources, Blue Water that has become (for

whatever reason) Brown Water or Blue Water that has been advertently or mistakenly contaminated with Brown Water.

.8 Blue Water - inflows to the cofferdams that can be effectively and efficiently captured and returned directly to the watercourse either upstream or downstream without any turbidity or pH treatment but behind a turbidity curtain. Blue Water inflows will consist primarily of infiltration water that finds its way through, around or under the cofferdam structures.

.9 Surge Capacity - This staging facility will serve to:
.1 Receive, retain and make available for recirculation filter backwash water, and
.2 Stage high flows with the large volumes of turbid water associated with the drawdown of each stage of the dewatering. Turbid water will be drawn from this staging facility and treated through the water treatment plant at manageable flow rates.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - SUBMITTAL PROCEDURES.

.2 Submit within ten (10) days of award of Contract, site specific Environmental Management and Protection Plan (SSEMPP) to the Departmental Representative who will coordinate review and acceptance by PCA's Environmental Authority. The Contractor shall not mobilize at site until the SSEMPP is accepted and approved by PCA's Environmental Authority and Historic Canal Regulations Permit (HCRP) is issued. Upon receipt of the HCRP, the Contractor can mobilize at site once instructed by the Departmental Representative.
.1 The SSEMPP and its component plans must be prepared by qualified environmental professionals in accordance with PCA's ESG document, July 2017, and the DIA.
.2 PCA's Environmental Authority will outline prescribed mitigation measures during the Preconstruction Kick Off Meeting.
.3 SSEMPP to detail frequency of monitoring and high-risk construction activities requiring environmental professional on site.
.4 The SSEPP will list the applicable legislative and regulatory requirements for each plan component.
.5 SSEMPP to present comprehensive overview of known potential environmental issues to be addressed during construction.

.1 Include a list of key project activities and phases and identify actual or potential environmental impacts associated with each activity.

.2 SSEMPP must show consideration for navigational water levels. SSEMPP must demonstrate that this condition is planned for and work activities will be halted or revised accordingly.

.6 The potential environmental issues associated with the construction activities include, SSEMPP must show consideration of early winter thaw and spring freshet conditions in the event that project timing slips into this period. SSEMPP must demonstrate that this condition is planned for and work activities will be halted or revised accordingly. The potential environmental issues associated with the construction activities include, but are not limited to, the following:

.1 Introduction of fines or silt into waterways or water column during placement of cofferdam, dewatering, concrete demolition, pouring of new concrete, cofferdam removal and commissioning.

.2 Contamination of waterways (e.g. water quality) due to spills during refueling; pouring of new concrete; hydraulic line rupture; accidental spill of lubricants or other manufacturers products used during construction.

.3 Change in Ph levels of the waterway during concrete or injection works.

.4 Destruction/disturbance of fish/wildlife or their habitat (including Species at Risk) due to improperly managed construction activities

.5 Potential introduction of invasive species due to the improper screening of materials brought to the site or improper cleaning of equipment and machinery

.7 Include measures to avoid causing harm to fish and fish habitat including aquatic species at risk in compliance with the Fisheries Act and Species at Risk Act.

.1 As part of the site specific EMPP identify measures to capture and relocate fish upstream and/or downstream of the dam, prior to dewatering, that may otherwise be harmed due to the dewatering and in-water works activities. Fish rescue and relocation shall be done by a qualified environmental consultant with collectors permit.

.8 Include details of monitoring plan that will verify that environmental performance objectives are met and protection of water quality in the waterway is ensured.

.9 Site specific EMPP to follow baseline water and stream bed quality indicated in Canadian Council of Ministries of the Environment (CCME) - Canadian Water Quality Guidelines for the Protection of Aquatic Life.

.10 Notify the Departmental Representative of proposed changes to project plans or schedules affecting the SSEMPP.

.11 Contractor to ensure on-site personnel is aware of, and complies with prescribed mitigation measures in the site specific EMPP.

.12 Address topics at level of detail commensurate with environmental issue and required construction tasks.

.13 Site specific EMPP to include:

.1 Names of Responsible Persons: qualified personnel responsible for ensuring adherence to site specific EMPP.

.2 Names of Waste Handlers: names and qualifications of persons responsible for manifesting hazardous waste to be removed from site.

.3 Names of Instructors: names and qualifications of persons responsible for training site personnel.

.4 Training Program: description of environmental protection personnel training program.

.5 Erosion and sediment control plan identifying type and location of erosion and sediment controls to be provided including monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations.

.6 Provisions for protection stockpile material, such as vegetating of material, for stockpile material that are to be inactive for a period exceeding 30 days are to form part of the erosion.

.7 Temporary Works: drawings showing locations of proposed temporary excavations or embankments for haul roads, stream crossings, access ramps, material storage areas, structures, sanitary facilities and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on site.

.8 Traffic Control Plans including measures to reduce erosion of temporary roadbeds by

construction traffic, especially during wet weather.

.1 Plans to include measures to minimize amount of material transported onto paved public roads by vehicles or runoff.

.9 Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use.

.1 Plan to include measures for marking limits of use areas and methods for protection of features to be preserved within authorized work areas.

.10 Spill Control Plan to include procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.

.11 Spill Prevention Plan: including location/procedures for storage and refuelling of all fuel and fuel operated equipment located near waterway. Fuel containers are to have secondary containment, overfill and spill protection. Fueling area is to be contained to address potential spillage. All heavy equipment used near waterway is to be in good condition. Any equipment that is leaking any fluid is to be removed from the site

.12 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris. Where waste materials are not to be incorporated into the works and are to be disposed off-site at an approved landfill as part of the Solid Waste Management Plan, provide to the Departmental Representative a letter from the receiving station agreeing to accept the waste material and Waste Site Certificate of Approval. Carry out disposal to the requirements on Ontario Regulation 347.

.13 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash do not become air borne and travel off project site.

.14 Contaminant Prevention Plan identifying potentially hazardous substances to be used on job site; intended actions to prevent introduction of such materials into air, water, or ground; and detailing provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials

.15 Waste Water Management Plan identifying methods and procedures for management and/or discharge of waste waters which are

directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water.

.16 Historical, archaeological, cultural resources biological resources and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands.

.17 Noise Control Plan: including notifying local residents in advance of potential disruption from noise activities. Establish a communications protocol/plan acceptable to the Departmental Representative.

.18 Potable Water Supply: including monitoring of existing groundwater wells. Where well water supplies are impacted, revise construction activities to mitigate the impact to the satisfaction of the Departmental Representative.

.19 Flood Contingency Plan: identifying measures to be undertaken in the event of significant flows in the waterway. Measures to include storage of equipment and material out of the waterway that have not been secured or form part of the construction works

1.5 FIRES

.1 Fires and burning of rubbish on site is not permitted on the project site.

1.6 TURBIDITY CONTROL AND DRAINAGE

.1 Comply with Ontario’s regulation for Water Taking Environmental Activity and Sector Registry

.2 Ensure turbidity control of water released during work using a heavy-duty DOT TYPE II turbidity curtains. Flow dissipaters and/or filter bags, or equivalent, shall be placed at water discharge points to prevent erosion and sediment release.

.3 Do not pump water and discharge directly into the waterway.

.1 Send discharge to settling pond or filtration area before releasing into waterway without releasing sediment or hazardous materials or causing additional erosion.

.2 Water from initial dewatering may be pumped directly into the waterway if turbidity of discharged water is less than background

turbidity levels observed upstream of work areas.

.3 Water from within 1 m of basin bottom or water with turbidity greater than background turbidity to be pumped to settling pond or sediment filtration system.

.4 For dewatering, fish screens must comply with DFO Freshwater Intake End-of-Pipe Fish Screen Guidelines when pumping in fish-bearing water to prevent impingement or entrainment of fish.

.5 Monitor water quality for suspended sediment levels exceeding identified requirements during in water activities.

.4 Provide marine grade heavy duty turbidity curtain (DOT type II) to enclose areas where sediments may enter waterway. Turbidity curtain to be fabricated for this Work, anchored, or weighted down along its length to form continuous seal on basin bottom and marine structures with adequate flotation at water surface to prevent over spills of turbid water. Sediment/turbidity curtains shall be as close to the work area as possible, and deployed in a manner that prevents entrapment of fish inside the curtain. If water levels/conditions do not permit the flotation of a turbidity curtain, other measures as approved will be implemented.

.5 The Contractor shall be prepared, where the full implementation of ESG controls for in water work will not allow them to meet discharge criteria to, at the Contractor's own cost, alter construction methodology, slow down, reduce construction intensity to meet specified discharge criteria through the completion of their work.

.6 Mechanical filtration of turbid water is also acceptable.

.7 Filter material will consider the grain size characteristics of the sediment and shall be designed around the principals of maintaining sufficient hydraulic flow and prevention of particle movement through the material.

.8 Provide sediment control during any in-water work to control turbidity levels. Controls to be implemented prior to commencing Work and to remain in place until all suspended sediments have settled. Turbidity curtains should not be used as a settling area for dewatering activities.

.9 In-water work shall be performed in a manner that minimizes the disturbance of the watercourse bottom and dispersion of sediment.

.10 In the event of significant sedimentation or escape of debris caused by construction activities, the Contractor shall stop work immediately, notify the Departmental Representative and take appropriate measures to confine work and modify the SSEMPP including installation of new environmental measures or additional turbidity curtains.

.11 Provide temporary drainage and pumping as necessary to keep excavations and site free from water.

.12 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

.13 Sediment, debris, and erosion control measures to be inspected daily to ensure that they are functioning properly and are maintained and upgraded as required.

.14 If sediment, debris or erosion control measures are not functioning properly, no further work will be permitted until the sediment/ erosion problem has been rectified and accepted by Departmental Representative. Consider setting up backup settling pond in case first pond fails to work to keep pumps operating continuously.

.15 Sediment, debris and erosion control measures shall be left in place until disturbed areas within the work area have been stabilized and any sediments in the water have settled. Removal will be permitted only after written approval from the Departmental Representative.

.16 Water containing a high level of silt or sediment will be treated by discharging to settling basins, or sediment traps prior to release to waterway. Water quality downstream of construction activities and turbidity curtains to not exceed recommended DFO and CCME guidelines on water quality for protection of aquatic life.

.17 Control turbidity of water released during the Works as developed in the Erosion and Sediment Control Plan (ESCP) identifying type and location of erosion and sediment controls provided. Plan to include monitoring and reporting requirements to assure that control measures are in compliance with ESPC, Federal, Provincial, and Municipal regulations.

.1 Pumped water must meet water quality requirements prior to return to waterway.

.2 Water with harmful substances to be disposed in accordance with local authority, provincial and regulatory requirements.

.18 Where in-water work is required and pre-approved by Departmental Representative, the work area shall be enclosed by a heavy-duty turbidity curtain (DOT TYPE II) to prevent sediment escape from enclosed area.
.1 Monitor water quality for suspended sediment levels exceeding identified requirements during in-water activities.

.19 Situate pump system such that it does not re-suspend sediment from the watercourse bottom within the Work area or otherwise pump water from which particulates have not been allowed to settle. Where necessary, implement a pre-filtration step to further minimize transfer of suspended sediments.

.20 Set criteria wherein the allowable increase in total suspended solids (TSS) beyond background levels is 25 mg/l for short-term exposure (24 hr. period) and or maximum average increase of 5 mg/L for long term exposures (>24 hr. to 30d).
.1 Contractor shall provide protocol and methodologies for monitoring the TSS from any discharge point (treated or untreated) to the watercourse.
.2 Contractor to ensure that TSS levels at points of discharge and in the receiving environment do not exceed an absolute TSS value, to be based on the background value at the site, and determined prior to construction.

.21 Turbidity Monitoring may be completed in conjunction with monitoring of TSS.
.1 Turbidity monitoring should be completed during dewatering discharge that is ultimately received by a surface water feature, at a minimum frequency of twice per day during active dewatering.
.2 The representative background location of turbidity measurement should be at least 20-30 m upstream from the work zone, and the downstream location should be about 100 m downstream of the turbidity curtain should access allow, and within the discharge plume zone where feasible. Contractor to modify turbidity monitoring location if necessary. Once established, the upstream and downstream locations are to remain in the same locations.
.3 Daily turbidity records shall be maintained by the contractor.

.22 Develop Erosion and Sediment Control Plan (ESC) identifying type and location of erosion and sediment controls provided. Plan to include monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control

plan, federal, provincial, and municipal laws and regulations.

.1 Sediment, debris, and erosion control measures must be inspected daily to ensure that they are functioning properly and are maintained and upgraded as required.

.2 Backup ESC materials to be kept onsite to be available as needed.

.23 The following factors must be considered in determining the suitability of specific erosion control practices:

.1 Run-off quantity and velocity dictates the suitability of products.

.2 Soil characteristics: Soil texture and chemistry can affect the performance of many erosion control practices. Grain size characteristic of sediment must be considered when selecting filter fabric material. Filter fabric material shall be designed around principles of maintaining sufficient hydraulic flow and preventing particle movement through the material.

.3 Topography: The selection and success of erosion control practices is dependent on the slope length and gradient of surrounding area. The ease or difficulty of diverting clean run-off around the site is dependent on the terrain and drainage patterns; climate and season; contingency measures for extreme water events including rainfall and flooding need to be considered in the plan.

.4 Temporary versus Permanent Controls: some erosion control practices are intended as permanent measures.

Accessibility: Some practices require access for specialized equipment. Erosion and sediment control requirements for different construction phases.

.24 An environmental inspector should be on site, and provide advice, to ensure that activities that could have a negative impact to the natural environment are effectively mitigated as construction proceeds.

.25 If the ESC strategies outlined on the SSEMPP are not effective in preventing the release of a deleterious substance, including sediment, then alternative measures must be implemented to minimize potential. Changes to the SSEMPP must be

.26 approved by Departmental Representative and an updated SSEMPP/Permit may be required.

1.7 WILDLIFE PROTECTION

.1 Water drawdown to occur either before or soon after boating navigation season ends and not be lowered below winter operating levels to protect turtle species.

.2 Detail procedures for preventing turtle entry and nesting within disturbed project area in SSEMPP.

.3 Place temporary reptile exclusion fencing around stockpiled material and construction areas that may attract turtle nesting activities.

.1 Synthetic plastic Erosion Control Blankets/Mats should not be utilized, particularly during nesting season, as they pose as an entrapment hazard to turtles. Standard sediment fencing on site should not have mesh/netted backing. Fibre-based biodegradable Erosion Control Blankets/Mats only are to be utilized.

.2 Reptile exclusion fencing must follow the guidance in the document titled Species at Risk Branch, Best Practices Technical Note, Reptile and Amphibian Fencing, ver.1.1, developed by the Ontario Ministry of Natural Resources and Forestry.

.4 For guidance on how to plan and install exclusion fencing, refer to the document titled “Ontario Ministry of Natural Resources and Forestry. April 2016. Best Management Practices for Mitigating the Effects of Roads on Amphibians and Reptile Species at Risk in Ontario.” Environmental Management Plan to detail procedures for avoiding disturbance to wildlife and nesting birds, and Species at Risk.

.5 Site specific EMPP to detail procedures for avoiding disturbance to wildlife and nesting birds.

.6 If recommended by a qualified person and approved by Departmental Representative, exclusion zones or “no go” areas will be established to protect areas with known habitat (e.g., hibernacula, dens, nests).

.7 If recommended by a qualified person and approved by Departmental Representative, conduct “Pre-stressing” activities within a few days prior to the onset of site preparation (vegetation clearing and grubbing) to encourage wildlife to move away from a site.

.8 On a daily basis, an inspection or “sweep” of the work area shall be performed prior to commencement of project works and activities to ensure wildlife are not present in the work area (include in site checklist).

.9 Field information regarding incidental encounters with wildlife (non-SAR wildlife) shall be compiled and reported on a daily basis.

.10 For incidental encounters, the following information should be recorded in the field:
- .1 Locations, dates and time of day where the species were encountered;
- .2 Names of species encountered;
- .3 Photographs of the species, if taken;
- .4 Condition of animal.

.11 If injured/dead wildlife are encountered report to Departmental representative immediately. PCA may require retrieval and storage on ice of carcass for laboratory testing

.12 All vehicles and equipment used by project personnel will follow any construction zone speed limits to reduce the risk of hitting wildlife, as enforced by the site supervisor.

.13 Work areas will be kept clean and free of potential hazards to wildlife such as wire, cable, tubing, plastic, antifreeze or other materials that wildlife may eat or become entangled in.

.14 Waste will be stored, handled, and transported in accordance with the Waste Management Plan, including storage of all solid waste in sealed, bear-proof containers.

.15 Feeding of wildlife is prohibited.

.16 Site clearing to occur before wildlife nesting times - April 1 to August 31. If this is not feasible, the contractor must have the site inspected by a qualified biologist to check for the presence of nests and wildlife and obtain subsequent authorisation from the Departmental Representative prior to clearing.

1.8 AQUATIC LIFE PROTECTION

.1 In-water work is to be completed before March 15, each year, to protect fish populations. Restricted in-water activities between March 15th and June 30th are in water excavation, in-filling, rock/ armour stone placement, in water concrete/tremie pours, transfer/ movement of granular material or aggregates.

.2 Refer to Section 01 14 00 – WORK RESTRICTION for In-Water Work Restriction Period. All in-water work shall be completed outside of the In-water Works Restriction Periods.

.3 Amphibians, reptiles, fish or crustaceans that could become or have become trapped within dewatered cofferdam area, or in other construction zones, to be captured and transferred "live" immediately to the nearest waterbody as directed by the Departmental Representative.

.1 Work Program to be overseen by Departmental Representative and PCA's Environmental Authority to ensure proper capture and handling of aquatic life.

.2 Advise Departmental Representative and PCA's Environmental Authority 24 hours prior to fish rescue.

.3 Minimize length of time fish are out of water.

.4 Use appropriate equipment when removing stranded fish.

.5 Monitor Work areas with deeper pool areas where fish are congregating. If safe to do so, seine or dip nets can be operated to remove the fish.

.6 Document by species, counted and removed fish found within dewatered areas. Fish to be placed in the nearest water body.

.4 Should suspected species at risk, specifically snakes or turtles, be encountered during project staging, construction or demobilization, contact the Departmental Representative and PCA's Environmental Authority immediately.

.5 Report to Departmental Representative and PCA's Environmental Authority invasive species found within project area.

.6 Invasive species to be euthanized rather than returned to water system.

1.9 MIGRATORY BIRD PROTECTION

.1 Tree cutting and clearing work is not to be undertaken during the migratory bird nesting season, between April 1st and August 31st.

.2 If tree cutting and clearing work during the nesting season, a nest survey will need to be conducted by a qualified avian biologist immediately (within two days) prior to commencement of work to identify and locate active nests of species.

.3 If active nest are present, the Contractor shall develop a mitigation plan to address any potential impact on migratory birds or their active nests.

.4 The plan will need to be reviewed by Environment Canada prior to implementation.

1.10 SPECIES AT RISK

.1 Parks Canada has identified critical habitat for the following species and quantifies likelihood to be found at the site.

- Bald Eagle - **Confirmed**
- Bank Swallow – **Moderate**
- Barn Swallow – **Confirmed**
- Canada Warbler – **Low**
- Chimney Swift **– Low**
- Olive-sided Flycatcher
- Red-headed Woodpecker-**Moderate**
- Red-shouldered Hawk-**Low**
- Wood Thrush-**Moderate**
- Monarch – **Low**
- Blanding's Turtle – **Moderate**
- Eastern Musk Turtle – **Low**
- Midland Painted Turtle -**High**
- Northern Map Turtle – **High**
- Snapping Turtle – **Confirmed**
- Eastern Milksnake – **Low**
- Eastern Ribbonsnake – **Low**
- Five-lined Skink-**Low**
- Little Brown Myotis – **Low**
- Northern Myotis – **Low**
- Tri-colored Bat – **Low**

.2 Minimize disturbed areas and clearly mark Work space. Park on roads or disturbed areas only.

.3 Provide training to all employees before beginning work on site on identifying species at risk and procedures to follow if species at risk are encountered. Employees must be able to identify potential species at risk and know the proper procedures to follow when they encounter a species at risk. Special emphasis will be made on Blanding's Turtle sightings.

.4 Perform daily site sweeps before beginning work to ensure that there are no species at risk in work area.

.1 Should any suspected species at risk be encountered during construction - project staging, implementation or demobilization - halt work immediately and notify Departmental Representative.

.2 The species must not be harmed or harassed. Stand back and allow the animal to leave the site.

.3 If a turtle or snake is found within the limits of the fencing it should be left alone to leave the area if possible or the animal should be gently placed outside of the construction site. Typically, animals should be released not more than 250m from the capture site. Release sites should be near water with vegetation cover for shelter.

.4 Contact Departmental Representative on how to proceed if species at risk does not or cannot leave site on its own accord. Additional measures to avoid impacts may be required before work can restart.

.5 Once trees have been felled, they must inspected for the presence of bat droppings in order to confirm possible use of these trees by local bat population. A qualified personnel must undertake this assessment and report findings to the Departmental Representative.

1.11 INVASIVE SPECIES

.1 Clean mud, dirt and vegetation off machinery and equipment before entering and leaving the work site. Inspect and clean in accordance with Clean Equipment.

.2 Equipment and vehicles to be used in water, to be cleaned before and after use. This includes any visible mud, vegetation, mussels.
- .1 Drain of standing water.
- .2 Clean with hot water (>50˚C) at high pressure (>250 psi, >1700 kPa).
- .3 Allow to dry for 2-7 days in sunlight before transporting between waterbodies.
- .4 Conduct cleaning minimum 30 m from edge of waterbody.

.3 Should an invasive species be encountered (or at least suspected), a photo and report of the specimen should be sent to the Departmental Representative. Known invasive species already existing in the Trent-Severn Waterway system at the specified location:
- .1 Purple Loosestrife.
- .2 Round Goby.
- .3 Rusty Crayfish.
- .4 Tatarian Honeysuckle.
- .5 Water Soldier.
- .6 Wild Parsnip.
- .7 Yellow Iris.

.4 Round gobies and other invasive species found during dewatering activities shall be euthanized and not returned to the water system. This shall be reported to the Departmental Representative.

.5 Use weed-free material for erosion control and stabilization ensuring that seed does not potentially contain invasive plants.

.6 Commercially purchased seeds should have a label that states the following:
- .1 Species.
- .2 Purity: no less than 90%.
- .3 Weed seed content: tag should state no invasive plants are present, only use certified weed-free seed.
- .4 Germination of desired seed: germination should not be less 50% for most species with exceptions for some shrubs and forbs.

.7 Move only contaminant-free materials to non-infested areas to prevent spread of invasive plants.

.8 Mud, dirt and vegetation should be cleaned from clothing and footwear prior to entering the work site, and prior to leaving the work site.

.9 Preventative and Control Measures, as identified in the Ontario Waterways (2017) document to be incorporated into the SSEMPP and implemented by the Contractor.

.10 If removal of invasive species occurs, individuals will be disposed of appropriately, offsite to ensure no further propagation.

1.12 PLANT AND TREE PROTECTION

.1 Protect trees, trees roots and plants on site and adjacent properties where indicated.

.2 Provide barriers around trees which may be affected by work, including staging areas.
- .1 Erect barriers at dripline plus a 1.5 m distance within Work area.
- .2 Barriers consist of Plastic fencing, “international orange” plastic (polyethylene) web fencing secured to conventional metal “T” or “U” posts driven to a minimum depth of 450 mm on 2 m minimum centers shall be installed at the limits of clearing, or as otherwise approved in the SSEMP.
- .3 Maintain barriers in good repair throughout duration of Work.
- .4 Remove barriers upon completion of Work.
- .5 Where restrictions impede barrier placement, seek acceptance of Departmental Representative for alternative solutions.

.3 Protect roots of designated trees to dripline plus 1.5 m during excavation and site grading to prevent disturbance or damage. Avoid unnecessary traffic, dumping and storage of materials over root zones.
- .1 In the event that the installation of root-protectant fencing is not possible and/or ideal, alternative measures, as approved by PCA, must then be implemented. Such measures must provide a sufficient amount of soil compaction prevention with regards to the highest level of activity to occur within the immediate area of protection.

.4 Limit clearing, grubbing, and tree branch removal to areas of work or access indicated on accepted shop drawings.

.5 Damage to trees due to Contractor's operations:
- .1 Where practical, the branches of the large trees should be trimmed back as the first option rather than cutting the entire tree
- .2 Broken branches 25 mm or greater in diameter: cut back cleanly at break, or to within 10 mm of their base, if substantial portion of branch is damaged Departmental Representative will direct.
- .3 Exposed roots 25 mm or larger: cut back cleanly to soil surface within five (5) calendar days of exposure.
- .4 Damaged bark: neatly trim back to uninjured bark, without causing further injury, within five (5) calendar days of damage.

.6 Reduce soil displacement and compaction by using heavy machinery in designated areas, construction access roads, and on existing vehicle paths.

.7 Use equipment of low bearing weight and low- pressure tires whenever possible, and avoid using heavy machinery on saturated ground.

.8 De-compact subsoil which has been compacted from the movement of construction equipment and project staging.

.9 Prune trees close to trunk, make shallow undercut first, then follow with top cut. Do not use axe for pruning.

.10 Cut trees at ground level and do not leave pointed stumps.

.11 Clear vegetation by hand from unstable or erodible banks; where possible avoid using heavy machinery.

.12 Replace damaged lawn to pre-construction state with topsoil and sod in work zone.

.13 No vegetation clearing to occur between April 1st and August 31st of any year to protect nesting birds.

- .1 If vegetation clearing must take place during this period, an avian biologist must be present to screen and clear the area of nests no more than (2) days prior to clearing.

.14 Prepare suitable planting plan and erosion and sediment controls for acceptance by Departmental Representative when conducting grubbing.

.15 Use native species for tree planting and ground cover with mulch to prevent erosion and help seeds germinate.

.16 Keep site stabilized if there is insufficient time (at least four weeks) remaining in the growing season for seeds to germinate, or if at risk of germinating and being damaged by frost.

.17 Visual site inspections to be conducted in spring and fall for first two growing seasons following planting. If any plantings are found dead or failing, mitigation measures to be implemented to reduce risk of future failure and plants to be replaced and monitored accordingly.

.18 Trees, shrubs and vegetation which are to remain throughout construction should be properly identified and delineated.

.19 Disturbance of vegetation along shoreline must be limited to what is required for allowing reasonable completion of the project with minimal environmental impact; if necessary, riparian vegetation will be removed last and kept to a minimum.

.20 Should any vegetation require chipping/mulching, the after product will be stored on site for the duration of the project to supplement erosion and sediment control methods when required.

.21 Minimize clearing as much as possible to maintain riparian vegetative cover and windbreaks, where possible maintain vegetated buffer at shoreline and minimize clearing near water bodies. If buffers cannot be maintained, avoid grubbing of vegetation root mass in proximity to shorelines and stream banks. Vegetation clearing from unstable or erodible banks or riparian areas shall be minimized or undertaken by hand.

.22 Delineate areas to be avoided with flagging tape or temporary fences.

.23 Ensure appropriate handling procedures are followed for noxious weeds such as Giant Hogweed or Wild Parsnip.

.24 Root system of trees identified to remain should be properly delineated and fenced off, so as to protect the root system from being crushed and impacted by machinery.

.25 In the event that the installation of root- protective fencing is not possible and/or ideal, alternative

measures, as approved by PCA, must then be implemented. Such measures must provide sufficient amount of soil compaction prevention with regards to the highest level of activity to occur within the immediate area of protection.

.1 For areas of light-to-medium levels of traffic activity, a geotextile cloth shall be placed over the area of protection and covered with 200 mm, minimum, thick layer of wood mulch material.
  .1 Pins or staples must be used to secure the geotextile material to the ground.

.2 For areas of medium-to-high levels of traffic activity, a geotextile cloth shall be placed over the area of protection and covered with

.3 200 mm, minimum, thick layer of wood mulch material. The wood mulch material shall then be covered with 19 mm thick sheets of plywood.
  .1 The plywood will break down over time, and shall be replaced periodically to retain its effectiveness.
  .2 19 mm thick laminated large sheets of plywood are recommended for use.

.4 Over time, wood mulch material can degrade, move, or wash away. Wood mulch must be replenished as necessary in order to maintain a layer of 200 mm thickness at all times.

.5 Wood mulch material should not be permitted to pile against the trunk(s) or root flare(s) the tree(s), as this may lead to unwanted bark rot and damage to the tree, subsequently leading to reduction in tree(s) health and potentially tree(s) death.

.6 Alternative methodology for soil-compaction prevention may be utilized (ex. blast mats), as reviewed and approved by the Departmental Representative.

.26 Native grasses, shrubs, etc. should be planted to match existing species growing on the sites as per restoration plan.

.27 Common milkweed should be actively restored. If milkweed has grown by project initiation, then as a precautionary measure, plants should be pulled and moved to non-affected areas where milkweed is growing, if there is the potential for larvae and eggs to be present on the affected plants.

.28 The success of all vegetative plantings shall be assessed through visual site inspections conducted at least once each spring and each fall for the first two growing seasons following planting. If at any time during the monitoring period any plantings are found dead or failing, mitigation measures shall be implemented to reduce the risk of future failure and

the plants shall be replaced and monitored accordingly.

1.13 IN-WATER WORK

.1 Refer to Section 01 14 00 – WORK RESTRICTION for In-Water Work Restriction Period.

.2 In-water work includes the construction of temporary cofferdams, the discharge of turbid water directly to the waterway, tremie pours, placement of rip rap or granular material and the removal of the existing structures.

.3 All work must comply with the Fisheries Act, as regulated by the federal department of Fisheries and Oceans Canada (DFO).

.4 In-water work must comply with Parks Canada Agency (PCA) and Ministry of Natural Resources and Forestry (MNRF) in-water timing windows.

.5 Make every effort to minimize time working in the waterway. Accordingly, all necessary materials and equipment shall be on site before proceeding such that delays waiting for materials or equipment do not occur once in-water activities have commenced.

.6 In-water work shall be performed in a manner that minimizes the disturbance of the waterway bottom and dispersion of sediment.

.7 Work shall occur in the dry using appropriate dewatering procedures for the site. Dewatering procedures and systems to be set out in EMP as applicable and approved by Departmental Representative.

.8 No acid-bearing (containing sulfides) rock shall be used for in water works.

.9 Monitor water quality for suspended sediment levels exceeding identified requirements during in water activities.

.10 Only the working part of a machine is to enter the water; any part of a machine or equipment entering the water shall be free of fluid leaks and externally degreased to prevent any deleterious substance from entering the water. Complete the in-water activity as quickly as possible to minimize the time equipment is in the water; do not leave equipment in water during breaks in work activity.

.11 Only clean material free of fine particulate matter shall be placed in the water.

.12 Dewatering, demolition and construction is staged such that clean water, meeting the requirements of these specifications, is pumped back to the system and turbid water is managed through a wastewater system.

.13 All work should be completed in the dry with the exception of existing dam demolition. A Dewatering Plan will be incorporated into the SSEMPP, and will be reviewed and approved by Parks Canada for review and acceptance prior to any dewatering.

.14 All debris on bed (including unused aggregate/concrete rubble) shall be completely removed and area restored to original state upon completion of work.

.15 Sediment/turbidity curtains shall be deployed in a manner - e.g. moved in a direction from close to shore/structures outward - that prevent entrapment of fish inside the curtain.

.16 Ensure that there is a fish screen that complies with DFO Freshwater Intake End-of-Pipe Fish Screen Guideline when pumping in fish-bearing water to prevent impingement or entrainment of fish.

.17 Fish shall be removed from the work area prior to complete dewatering and released alive downstream into the river.

- .1 Parks Canada's Environmental Authority shall be advised 24 hours prior to fish rescue.
- .2 Minimize the length of time fish are out of the water.
- .3 Use appropriate equipment to remove any stranded fish in the dewatered area. As water levels drop in the work area monitor the deeper pool areas where fish are congregating. If safe to do so, Seine nets or Dip nets can be operated by field staff to remove the fish.
- .4 Contact PCA Environmental Authority staff should there be any issues with fish removal.
- .5 Any fish found within the dewatered coffer dam areas will be documented by species, counted and removed and placed downstream if found in the downstream coffer dam and upstream if found upstream.
- .6 Any invasive species found during dewatering activities shall be euthanized and not returned to the water system; this shall be reported to the Departemental Representative.

.18 Any equipment or vehicles which are to be used in water, should be thoroughly cleaned before and after use of any visible mud, vegetation, mussels, etc.

.19 Placement of loose granular material in the waterway is prohibited, unless approved by the Departmental Representative.

1.14 WORK NEAR WATERWAYS

.1 Do not release deleterious materials into waterways.

.2 Do not use salt as a de-icer or sand for traction within 30m of waterway.
- .1 Where ice is a safety concern, use environmentally acceptable de-icing or traction materials approved by PCA.
- .2 No de-icer or traction materials shall be allowed to enter the waterway.
- .3 Follow Manufacturer's instructions for application of de-icing products.

.3 Ensure equipment and temporary access structures, such as scaffolding, placed in waterbodies are free of earth material, and excess, loose or leaking fuel, lubricants, coolant or other deleterious material that could enter the waterway.
- .1 Contractor to ensure appropriate use and disposal of all products (sealants, lubricants or other compounds) used on site, in accordance with manufacturer's recommendations and product technical data sheets.

.4 Do not use waterway beds for borrow material.

.5 Do not dump excavated fill, waste material or debris in waterways.

.6 Design and construct temporary crossings to minimize erosion to waterways.

.7 Stockpiles of excavated or fill materials must be stored and stabilized away from water. Runoff from the excavated or fill material must be contained from entering the watercourse by sediment fencing installed 1 m out from the base and all around the stockpiled material. Stockpiled material shall be covered with tarpaulin or other approved covering.

.8 Paint metal and wood surfaces in an environmentally safe way and take appropriate preventative and corrective actions.

.9 Concrete leachate is alkaline and highly toxic to fish and aquatic life. Measures must be taken to prevent

any incidence of concrete or concrete leachate from entering the watercourse. Maintain complete isolation of all cast-in-place concrete and grouting from fish-bearing waters for a minimum of 48 hours if ambient air temperature is above 0°C and for a minimum of 72 hours if ambient air temperature is below 0°C or until significantly cured to allow the pH to reach neutral levels.

.10 Mitigation Measures for Placement of Tremie Concrete:
- .1 Ensure concrete forms are tight and no flow is occurring;
- .2 Isolate area with curtain or impermeable material specified for concrete particulates; ensure fish exclusion is followed;
- .3 Isolated area should be the minimum size required to complete task;
- .4 For tremie pours, CO_2 system must be installed and operating along the entire length of the isolated area; the tank shall be used to release carbon dioxide gas into an affected area to neutralize pH levels. Ensure sufficiently sized tanks for the concrete volumes used;
- .5 Workers shall be trained in the use of the system;
- .6 Use of neutralizing acids is not permitted;
- .7 pH monitoring must be conducted inside, outside and downstream of the containment area while the activity is taking place. Monitoring locations and frequency shall be outlined in the EMP/Site Plan.

1.15 CORRECTIVE ACTIONS FOR IN_WATER WORKS

.1 When water quality is not in compliance with the required water quality performance criteria limits, adjust operations and mitigations to minimize turbidity. No claims for delays or adjustment to operations resulting from water quality exceedances.

.2 In-water work will cease at the first indication of a significant oil sheen or distressed or dying fish in the vicinity of the work area.

.3 Should conditions at the work site indicate that there are negative impacts to fish or their habitat, adjust operations and mitigations to minimize negative impacts until the problem has been corrected.

.4 If turbidity spikes confirmed, report that to Department Representative and investigate potential cause of spike and take corrective actions upon approval by the Departmental Representative.

1.16 POLLUTION CONTROL

.1 Maintain temporary erosion and pollution control features installed under this Contract.

.2 Spills of deleterious substances:
- .1 Immediately contain, limit spread and clean up in accordance with provincial regulatory requirements.
- .2 Report immediately to Ontario Spills Action Centre: 1-800-268-6060 and the Departmental Representative.
- .3 Further information on dangerous goods emergency cleanup and precautions, including a list of companies performing this work can be obtained from the Transport Canada 24-Hour number 613-996-6666.
- .4 Using appropriate safety precautions, collect liquid or solidify liquid with an inert, non-combustible material and remove for disposal.
- .5 Be responsible for all costs of cleaning up any spills to the satisfaction of the Departmental Representative.
- .6 Have an environmental emergency response plan in place and a spill kit readily available.

.3 Provide spill response materials including but not limited to containers, absorbents, shovels, and personal protective equipment. Ensure that spill response equipment and materials are available at all times in which hazardous materials or wastes are being handled or transported and in which there is potential for release of hydrocarbon sheens as a result of the Work. Spill response materials to be compatible with the type and quantity of materials being handled.

.4 Ensure worker use of personal protective equipment appropriate to minimize risk of exposure to sediment and water in Work area. Personal protective equipment shall include, as a minimum, gloves, long-sleeved shirts, long pants, waterproof/chemical resistant footwear and safety glasses.

.5 Provide appropriate hand wash stations and wash stations to remove adhered sediments from personal protective equipment. Wash waster shall not be allowed to enter the waterbody, but should be contained and disposed of off site.

.6 Manage the release of hydrocarbon sheens during the work in the same manner as spills, as per Spill Control Plan. Maintain a spill containment kit on site and train workers in use. Prepare and post in an accessible location a spill response plan that includes contact information for the Departmental

Representative and applicable spill response agencies (e.g. MECP).

.7 Manage snow and water from refuelling drip trays to prevent contamination of water. All spills on snow, ice or frozen ground shall be cleaned-up immediately and reported.

1.17 EROSION, SEDIMENT AND DUST PROTECTION

.1 Submit Surface Water, Erosion and Sediment Management plan, prepared by a qualified individual as part of the Environmental Management Plan (EMP). The plan shall include:
- .1 Focus primarily on erosion control and sediment control secondarily.
- .2 Areas to be controlled, including adjacent areas that could be negatively impacted by construction activities.
- .3 Drainage areas and patterns based on construction design and site topography.
- .4 Plan for directing sediment-laden run-off to on-site detention or retention facilities.
- .5 Plan for diverting clean storm run-off from site and exposed areas.
- .6 Channels for necessary design discharge.
- .7 Plans for temporary and permanent erosion control needs for all channels.
- .8 Consideration of project schedule in selecting environmental controls.
- .9 Consideration of seasonal requirements and plans for design controls and practices for controlling associated erosion and settlement.

.2 All areas of the work site prone to erosion which are disturbed by ongoing work shall be stabilized with erosion control blankets, mulch and/or pre-approved alternative methods to keep soil in place.

.3 Prior to starting work that will create dust or debris, install effective mitigation techniques for erosion, sediment, dust and debris control in accordance with Federal, Provincial and Municipal laws and regulations, and to the satisfaction of the Departmental Representative.
- .1 Maintain these protective measures at all times, including during shut down periods.
- .2 Choose appropriate controls based on particle sizes present in sediments.

.4 Provide 1 m high sediment barrier in areas where, due to construction activities, sediment or debris may enter the waterway. This includes, but is not limited to, sediment barrier installed around staging and work

areas, and on waterway bed (or ice surface) parallel to embankments and/or retaining walls. Install heavy duty DOT TYPE II turbidity curtain approximatively 2 m to 3 m from embankment or wall.

.5 Maintain stand-by supply of pre-fabricated sediment barrier, or an equivalent ready-to-install sediment control device.

.6 Maintain effective surface drainage and direct run-off away from work areas and into adequately vegetated areas.

.7 Excavation to cease during periods of heavy rainfall, unless run-off is contained from entering the waterway.

.8 Cover or wet down dry materials and rubbish to prevent blowing dust and debris.

.9 Implement erosion and sediment control measures prior to Work and maintain during Work phase. The following principles shall be considered:
- .1 Diversion to limit run-off water.
- .2 Reduction of erosional forces by surface water velocity reduction.
- .3 Reduction of sediment development through sediment collection or anchoring.
- .4 Sedimentation of mobilized sediments.
- .5 Filtration of sediment carrying flows.
- .6 Collection of captured or contained sediments.
- .7 Treatment of pH.

.10 Erosion and sediment controls must be selected to treat particle size present in native soils and sediments on the Work.

.11 Consider particle size present in the sediment and native soils including concrete sediments to select appropriate control options.

.12 Environmental protection measures shall be checked after each significant weather event. Avoid activities that could lead to erosion during excessively wet weather conditions; monitor forecasts for heavy rainfall watches and warnings.

.13 All disturbed areas of the work site shall be stabilized immediately and re-vegetated as soon as conditions allow. All exposed areas shall be covered with erosion control blankets or other measures to keep the soil in place and prevent erosion until vegetated in the spring.

.14 Phase vegetation removal to reflect construction activity; grubbing should not be conducted too far ahead and too large an area to be properly mitigated with Erosion and Sediment controls.

.15 Sediment control measures and exclusion fencing must be removed in a way that prevents the escape or re-suspension of sediments.

1.18 OPERATION AND MAINTENANCE OF EQUIPMENT

.1 Maintain machinery and equipment to be clean, free of leaks, and in optimal working condition fitted with fully functional emission control systems/muffler/exhaust baffles, engine covers, etc.; machines shall not be left to unnecessarily idle in order to avoid emissions.
  .1 Ensure measures are in place to minimize impact of spills.

.2 Provide and use drip trays under all fuel-powered equipment and machinery to prevent discharge of oil, grease, antifreeze or other materials into ground or waterways.

.3 Equipment and heavy machinery used shall meet or exceed all applicable emission requirements.

.4 All equipment to be thoroughly cleaned prior to arrival on site, to reduce risk of invasive species introduction from outside sources.

.5 Any vehicle or equipment entering the waterway to be free of fluid leaks and externally degreased.

.6 Any equipment or vehicles which are to be used in water, should be thoroughly cleaned before and after use of any visible mud, vegetation, mussels, etc.:
  .1 Vessels/equipment should be drained of standing water.
  .2 Vessels/equipment should ideally be cleaned with hot water (>50 °C) at high pressure water (>250 psi).
  .3 Vessels/equipment should be dried for 2 – 7 days in sunlight before transported between waterbodies.
  .4 Cleaning of vessels/equipment should be conducted away from waterbodies at a recommended distance of at least 30 m from the shoreline.

.7 All equipment to be thoroughly cleaned prior to coming on site, to reduce risk of invasive species introduction from outside sources.

.8 Use biodegradable hydraulic fluids for machinery that will be working in or around the river.

.9 Do not operate heavy equipment in waterway, expect when operated from a barge or after dewatering is complete.

.10 Operate machinery from stable location.

.11 Only allow working end of machinery to directly enter water. Working end of machinery to be clean and free of leaks.

.1 Complete the in-water activity as quickly as possible to minimize the time equipment is in the water; do not leave equipment in water during breaks.

.12 Leave machinery running only while in actual use, except where extreme temperatures prohibit shutting machinery down.

.13 Designate a re-fuelling depot with spill management equipment in place. Re-fuelling areas will have a spill containment kit immediately accessible.

.14 Store oils, lubricants, fuels, and chemicals in secure areas on impermeable pads.

.15 Vehicle and equipment maintenance and re-fuelling to be conducted over impermeable/absorptive material situated at a designated area that is located at least 30 m away from nearest waterway.

.1 If 30 m is not possible, the area shall be submitted for review to the Departmental Representative.

.16 In case of fuel heaters required to be located nearer than 30 m from waterway, use large drip pan to contain possible leakage from heater or refuelling operations. Absorptive material to be placed at bottom of drip pan for added safety.

.17 There shall be no discharge of chemical and cleaning agents in or near aquatic habitats. All such substances shall be disposed of at a facility licensed to receive them.

.18 No overnight/long term parking is allowed on cofferdams. No long-term parking is allowed in dewatered areas. Exception may be given to large cranes or equipment after approval of Departmental Representative.

1.19 CONCRETE ACTIVITIES

.1 Maintain isolation of all cast-in-place concrete and grouting from fish-bearing waters for a minimum 48 hours if ambient air temperature is above 0°C and for a minimum of 72 hours if ambient air temperature is below 0°C or until significantly cured with pH reaching neutral levels.

.2 Avoid concrete and grouting activities during or immediately after wet weather conditions.

.3 Ensure use of concrete, sealants and other compounds in accordance with appropriate Product Technical Data Sheets.

.4 Ensure work involving cement containing materials will not deposit, directly or indirectly, sediments, debris, concrete, concrete fines, wash or contact water into or about the watercourse.

.5 Remove dust, debris, unused aggregate and concrete rubble generated as a result of concrete work and dispose off-site ensuring materials do not enter the waterway.

.6 Place concrete debris into watertight container daily, or more frequently as directed.

.7 Isolate all work from waterway.

.8 A CO_2 regulator, tank and diffuser hose will be kept on site in the event of concrete spills. The system will be sized for concrete volumes used in the work area. It should be deployed for tremie concrete, if required; or when forms are not or cannot be isolated from moving water.

.9 Use of neutralizing acids is not permitted.

.10 Direct concrete wash water to a collection and treat to effectively remove all suspended solids, dissipate velocity and prevent deleterious substances from entering the waterway.

.11 In the event of a release of concrete, notify the Departmental Representative, PCA's Environmental Authority and Ontario Ministry of the Environment, Conservation and Parks Spills Action Centre (1-800-268-6060).

.1 Clean up and execute remediation immediately in accordance with Provincial and Federal regulatory requirements and accepted by the Departmental Representative.

.2 Install additional turbidity curtain or sediment barriers as necessary.
.3 Document remediation and testing. Results to be submitted to Departmental Representative,

.12 Maintain pH at discharge point into watercourse between 6.5 and 9.0. Water with pH > 9 cannot be released directly back into the watercourse, but must be treated prior to release. Water with a pH ≥ 12.5 is considered toxic and treated as a hazardous waste under Ontario Regulation 347 of the Environmental Protection Act and wastewater in this condition must be removed from the site.

.13 Additional environmental mitigation measures are required for placement of tremie concrete, concrete or where forms are in contact with the water course, or where contaminated water may enter the watercourse:
.1 Ensure concrete forms are tight and no flow is occurring.
.2 Isolate area with curtain or impermeable material specified for concrete particulates;
.3 Ensure fish exclusion is followed;
.4 Isolated area should be the minimum size required to complete task.
.5 For tremie pours or where water comes into contact with the forms, CO_2 system must be installed and operating along the entire length of the isolated area; the tank shall be used to release carbon dioxide gas into an affected area to neutralize pH levels. Ensure sufficiently sized tanks for the concrete volumes used.
.6 Workers shall be trained in the use of the system.
.7 Use of neutralizing acids is not permitted unless the system is designed and implemented by a qualified professional.
.8 pH monitoring shall be conducted inside and outside the containment area.

.14 Unused admixtures and additive materials must not be disposed of into sewer systems, into lakes, streams, onto ground or in other location where they will pose health or environmental hazard.

.15 Prevent admixtures and additive materials from entering drinking water supplies or streams. Using appropriate safety precautions, collect liquid or solidify liquid with inert, non-combustible material and remove for disposal. Dispose of waste in accordance with applicable local, Provincial and National regulations.

1.20 CLEANING OF CONCRETE EQUIPMENT

.1 Use only trigger-operated spray nozzles for water hoses.

.2 The Departmental Representative will designate cleaning area and containment facilities for equipment and tools to limit water use and control run-off.

.3 Cleaning area to be no closer than 30 m from waterway to prevent contamination.
.1 If 30 m is not possible, the area shall be submitted for review to the Departmental Representative.

.4 Do not use lake/river water for washing trucks.

.5 Where no safe cleaning area is available, Contractor to provide a settling pond for area where equipment shall be cleaned. All alkali water is to be disposed of in accordance with Federal, Provincial, and local authority requirements.

.6 Employ measures to prevent entry of concrete wash water or leachate from uncured concrete into the watercourse.

.7 Direct concrete wash water to a collection site and treat effectively to remove all suspended solids and dissipate flow to prevent deleterious substances from entering the waterway.

.8 Water pH should be neutral before any clarified water is released to the drainage system or allowed to percolate back into the waterway via any filtration system.

1.21 REMOVED MATERIALS

.1 Unless otherwise specified, or specified as salvage materials, materials designated for removal become the Contractor’s property and shall be removed from the site.

1.22 HAZARDOUS MATERIALS

.1 Place materials defined as hazardous or toxic waste in designated containers.

.2 Comply with requirements of Workplace Hazardous Materials Information System (WHIMIS) regarding use, handling, storage and disposal of hazardous materials; and regarding labelling and provision of Safety Data

Sheets (SDS) acceptable to Human Resources Development Canada, Labour Program.

.3 Store hazardous materials in secure areas on impermeable pads and provide berms if necessary.

.4 Dispose of hazardous materials and designated substances in accordance with Ontario Regulation 347/90.

1.23 CLEAN UP

.1 Clean up work area continuously as work progresses.

.2 At the end of each work period, and more often if ordered by the Departmental Representative or PCA, remove debris from site, neatly stack material for use and clean up generally. Progress Cleaning should be in accordance with Section 01 74 11 - Cleaning.

.3 Permit no undue amount of debris, trash or garbage to accumulate on site.

.4 Concrete debris to be placed into watertight container daily, and or more frequently as directed.

.5 Separate and recycle materials that can be recycled.

.6 Do not bury rubbish on site.

.7 Dispose of waste or volatile materials, such as mineral spirits, oil or paint thinner by taking them to a specialized designated waste facility. Do not dump these into waterway, storm or sanitary sewers.

.8 Ensure all emptied containers are sealed and stored safely for disposal away from the public.

.9 Spills:

.1 Have environmental emergency response plan in place, spill kit, and other materials readily available on-site to respond quickly if spills occur.

.1 Spill kit to be maintained on site

.2 Contractor to ensure adequate additional resources available.

.2 Report spills and accidental sediment releases immediately to Departmental Representative, PCA Environmental Authority, and Ontario Ministry of Environment, Conservation and Parks, Spills Action Centre (Telephone No. 1-800-268-6060).

.3 Secure source of spill to stop flow of spill and isolate area of spill.

.4 Using appropriate safety precautions, collect liquid or solidify liquid with an inert, non-combustible material, or absorbent pads.

.5 Clean-up, remove, and dispose of contaminated materials in accordance with Federal requirements, SDS, or as directed by Ontario Ministry of Environment, Conservation and Parks.

.6 Be responsible for costs of cleaning up spills by method accepted by Departmental Representative.

.7 Submit documentation of remediation techniques and test results as requested to Departmental Representative.

.10 Remove scaffolding, temporary protection, surplus materials, tools, plant, rubbish and debris and dispose of them in an approved manner off site at completion date of work.

.11 Watercourse bottom to be cleaned of any unused construction materials/debris and restored to original state and grade upon completion of work within watercourse area.

.12 Clean areas under contract to a condition at least equal to that previously existing and to the approval of the Departmental Representative.

.13 Tools, equipment, temporary structures, utilities, barriers or parts thereof, used or maintained for the purpose of this project must be removed from site after completion of project.

1.24 TRANSPORTING AND DISPOSAL OF WASTE MATERIALS

.1 Waste subject to Ontario Environmental Protection Act must be transported with a valid “Certificate of Approval for a Waste Management System” to a site approved by the Ontario Ministry of Environment, Conservation and Parks to accept that waste.

.2 Obtain and submit Waste Generator Numbers, permits, manifests, and other paperwork necessary to comply.

.3 Recyclable material and waste to be removed from site in accordance with all Federal, Provincial and Municipal regulations to licensed disposal facilities in accordance with Section 01 74 21 – CONSTRUCTION/DEMOLITION WASTE MANAGEMENT and in accordance with regulations (i.e., O.Reg. 102/94 and O.Reg. 558/00, R.R.O. 1990, 347).

.4 Excavation, filling, pumping, towing, hauling, disposal and dumping operations for excavation will employ such methods and equipment to ensure no loss of materials into waterways.

1.25 AIR QUALITY AND NOISE CONTROL

.1 Minimize noise levels from construction activities by using proper muffling devices, in addition to appropriate timing and location of these activities to reduce or minimize the effect of noise on nearby residents, recreational users and wildlife.

.2 On-site vehicles to have a Drive Clean Emissions Report in accordance with O.Reg. 361/98: Motor Vehicles under the Environmental Protection Act, R.S.O.

.1 Departmental Representative or PCA Environmental Authority reserve the right to limit use or cease activity of mechanical equipment (vehicles, generators) if it is emitting excessive exhaust or suspected of fault emission control.

.3 Keep record of complaints and issues to monitor and mitigate public complaints.

.1 Contractor to address issues that arise.

.4 Comply with municipal noise by-laws and noise restrictions set out in 01 14 00 – Work Restrictions.

.5 Notify DR and identify in look ahead schedule, planned activities that may cause disturbances and schedule them to avoid sensitive time periods.

.6 Minimize idling of construction equipment and machinery.

.7 Use well maintained equipment and machinery fitted with fully function emission control systems, mufflers, exhaust baffles, and engine covers.

1.26 WATER QUALITY

.1 Do not exceed Ontario Water Quality Guidelines due to project activities.

.2 Ensure that sediment settling basins are of adequate size to allow for excess sediment run-off and erosion.

.3 Place only washed and clean material free of fine particulate matter in or near water where previously planned or authorized. Placement of loose granular

material in the watercourse is prohibited, unless approved by the Departmental Representative.

.4 Snow containing salt or sand may not be dumped or allowed to melt into the waterway.

.5 Water quality to be maintained in accordance with Canadian Council of Ministers of the Environment (CCME), Canadian Water Quality Guidelines for the Protection of Aquatic Life.

.6 Record pH measurements of water inside and outside containment area.

.7 Water with pH>9 cannot be released directly into the watercourse; such water must be treated prior to release.

.8 Water with pH>12.5 is treated as a hazardous waste in accordance with Ontario Regulation 347/90 of the Environmental Protection Act and water must be removed from site.

.9 Monitor water for: unacceptable levels of suspended sediments and turbidity.

.10 Submit weekly water quality reports.

.11 In the event pH, sedimentation or turbidity exceed identified thresholds, adjust and implement additional mitigation measures accepted by Departmental representative.

.12 Store chemicals and materials in dry storage to prevent infiltration of leachate into water table or surface run- off.

.13 Water containing harmful substances shall be disposed of in accordance with local authority, Provincial and regulatory requirements.

.14 Stop work in the immediate area in the event that pH, turbidity or sedimentation exceed identified thresholds and implement mitigation measures accepted by the Departmental Representative.

1.27 FLOODS, EXTREME WEATHER AND ICE FORMATION

.1 Undertake construction under normal weather conditions, to the extent possible, and design project worksite to withstand variable weather conditions.

.2 Minimize the risk of inundation due to wet weather by grading, providing drainage and covering or protecting surfaces.

.3 Stabilize work area against impact of high flow and heavy rainfall events at the end of each work day.

.4 Restrict construction activities and stabilize excavations during wet weather to reduce surface run-off from exposed Work areas.

1.28 NOTIFICATION

.1 The Departmental Representative will notify the Contractor in writing of observed non-compliance with Federal, Provincial or Municipal environmental laws or regulations, permit and other elements of Contractor's Environmental Management Plan.

.2 After receipt of such notice, the Contractor shall inform the Departmental Representative of proposed corrective action for approval by the Departmental Representative.
.1 Take action only after receipt of written approval by the Departmental Representative.
.2 The Departmental Representative will issue stop order of work until satisfactory corrective action has been taken.

.3 No time extensions shall be granted or equitable adjustments allowed to Contractor for such suspensions.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used

PART 3 - EXECUTION

3.1 GENERAL MITIGATION MEASURES

.1 Contractor shall comply with and enforce compliance by employees of prescribed environmental mitigation measures outlined in Environmental Management and Protection Plan and DIA Mitigation Measure (DIA) and other federal, provincial, territorial or municipal acts or regulations applying to the National Parks and Historic Sites of Canada.

.2 Execute, during the work, the environmental mitigation measures mentioned below.

.1 Fish and Fish Habitat – Minimize the duration of in-water work.

.2 Abide by these mitigation measures and best management practices outlined within Fisheries and Oceans Canada's (DFO's) online guidance materials: Measures to Avoid Causing Harm to Fish and Fish Habitat(http://www.dfo-mpo.gc.ca/pnw-ppe/measures- mesures/measures-mesures-eng.html)

.3 Suspend in-water work activities during periods of heavy rains.

.4 Do not proceed to in-water work /activities during the timing restrictions as per section 01 14 00 - WORK RESTRICTIONS.

.5 With the exception of the installation of the cofferdams, complete in-water work in the dry.

.6 Cofferdam fill to be washed and free of fines. Locations for the granular cofferdams to be isolated and fish salvage/rescue conducted prior to infilling using floating sediment curtain from the water surface to the river bed.

.7 The intakes of pumping hoses will be equipped with an appropriate device to avoid entraining and impinging fish.

.8 Retain the services of a qualified fish biologist who will be on-site during the de-watering process in order to rescue stranded fish (or other aquatic fauna).

.9 Should water from the river overtop isolated areas, dewater following the above procedures.

.10 For bank stabilization use rip-rap consisting of clean rock, free of fines.

.11 Use clean machinery free of leaks.

.12 Following completion of each phase of construction, retain the services of a biologist who will survey the downstream area of dried waterbed prior to removal of the cofferdams to confirm that spawning habitat has been returned to pre-construction conditions or better. The upstream cofferdam can then be removed slowly with the sluice gates closed (to minimize transportation of fines downstream).

.13 Activities will follow measures to Avoid causing harm to Fish and Fish Habitat including Species at Risk:

.1 No blasting is allowed.

.2 Schedule work to avoid wet, windy and rainy periods that may increase erosion and sedimentation.

.3 Develop and implement an Erosion and Sediment Control Plan for the site that minimizes the risk of sedimentation of the waterbody.

.4 Note that additional mitigation measures to protect water, soil and sediment quality are also required to protect Fish and Fish Habitat.

.5 Capture and relocation of an endangered or threatened aquatic species at risk will require approval from DFO.

.14 If recommended by a qualified person and approved by Departmental Representative, exclusion zones or "no go" areas will be established to protect areas with known residences (e.g., hibernacula, dens, nests).

.15 If recommended by a qualified person and approved by the Departmental Representative, conduct "Pre-stressing" activities within a few days prior to the onset of site preparation (vegetation clearing and grubbing) to encourage wildlife to move away from a site.

.16 On a daily basis, an inspection or "sweep" of the work area shall be performed prior to commencement of project works and activities to ensure wildlife is not present in the work area (include in site checklist).

.17 Field information regarding incidental encounters with wildlife (non-SAR wildlife) shall be compiled and reported on a daily basis. For incidental encounters, the following information should be recorded in the field:

.1 Locations, dates and time of day where

.2 the species were encountered;

.3 Names of species encountered;

.4 Photographs of the species, if taken;

.5 Condition of animal.

.18 If injured/dead wildlife are encountered, report to Departmental Representative immediately. Departmental Representative may require retrieval and storage on ice of carcass for laboratory testing.

.19 All vehicles and equipment used by project personnel will follow any construction zone speed limits to reduce the risk of hitting wildlife, as enforced by the Departmental Representative.

.20 Work areas will be kept clean and free of potential hazards to wildlife such as wire, cable, tubing, plastic, antifreeze or other materials that wildlife may eat or become entangled in.

.21 Waste will be stored, handled, and transported in accordance with the Waste Management Plan, including storage of all solid waste in sealed, bear-proof containers.

.22 Feeding of wildlife is prohibited.

3.2 BIRDS

.1 Conform to the Migratory Bird Convention Act, 1994

.2 Minimize the removal of natural vegetation.

.3 Retain the services of a qualified biologist to educate workforce on potential wildlife which could occur in the vicinity of the work area and measures to avoid wildlife.

.4 Removal of woody vegetation will not occur during the breeding bird season from March 31st to August 31st inclusive, unless a qualified biologist has searched the site for nests and concluded that no nests are present, no more than 7 days prior to clearing. If nests are found, a protective buffer around the nest location will be required until such time that the nest is abandoned.

.5 When possible, complete work during daylight. If nighttime lights are used, they are to be installed so as to illuminate the work area only to minimize impacts to nighttime activities of wildlife.

.6 Install the appropriate mufflers on vehicles and equipment.

.7 Minimize vehicle and equipment engine idling.

.8 Designate access routes for construction vehicles from and to the construction area.

3.3 NOISE AND VIBRATION

.1 Vehicles and equipment will have the appropriate Mufflers installed.

.2 Minimize vehicle and equipment engine idling.

.3 Designate access routes for construction vehicles from and to the construction area.

.4 When possible complete work during daylight hours and in accordance with local noise bylaws.

.5 Notify residents of planned activities that may cause disturbance and schedule them to avoid sensitive time periods.

3.4 PUBLIC AND HEALTH SAFETY

.1 Clearly delineate works using fencing and appropriate signage prior to commencement of construction.

.2 Site fencing shall be of solid material construction.

.3 Restrict public access to site during construction works and access to the site is limited to construction personnel.

.4 Access to site will be completed via controlled access points.

.5 Remove designated substances per industry Best Management Practices and safety guidelines prior to construction.

.6 Identify/label, record, and report of regulated wastes, products and substances, together with hazardous material through a Workplace Hazardous Material Information System assessment (WHMIS).

.7 Designate access routes for construction vehicles from and to the construction area and speed limits will be established and adhered to as necessary.

.8 Handle construction waste to the Waste Management Plan including the safe handling and appropriate disposal of designated substances.

.9 Designate a temporary waste storage area that meets the requirements of the Ontario Environmental Protection Act, Guidelines for Environmental Protection Measures at Chemical and Waste Storage Facilities (2007), Fire Protection and Prevention Act (Fire Code) and Ontario Regulation 347. Maintain the area so as to prevent leaks, spills or damage/deterioration to waste containers, has adequate containment, is secure, is protected from weather and is not located in an area within 30 m of a watercourse and has no direct drainage leading to a watercourse.

.10 Provide appropriate disposal containers for the prompt disposal of waste.

.11 Remove full disposal containers to the appropriate waste disposal facility on a regular basis.

.12 Handle wastes that require special handling requirements according to the appropriate local, provincial and federal legislation.

.13 Collect organic/food waste daily and store it in closed, animal resistant containers until disposed of at an approved waste disposal site.

.14 Keep the staging area tidy and free of litter.

3.5 AESTHETICS

.1 Clearly delineate the work areas using fencing and appropriate signage prior to commencement of construction.

.2 Limit access to the site to construction personnel.

.3 Provide appropriate disposal containers for the prompt disposal of waste and remove full disposal containers to the appropriate waste disposal facility on a regular basis.

.4 Remove solid nonhazardous construction waste (e.g. material packaging) generated during the construction process from the site to an approved disposal/recycling location.

.5 Collect organic/food waste daily and store it in closed, animal resistant containers until disposed of at an approved waste disposal site.

.6 Handle construction waste according to the Waste Management Plan.

.7 Designate a temporary waste storage area that meets the requirements of the Environmental Protection Act, Guidelines for Environmental Protection Measures at Chemical and Waste Storage Facilities (2007), Fire Protection and Prevention Act (Fire Code) and Ontario Regulation 347. Maintain the area so as to prevent leaks, spills or damage/deterioration to waste containers, has adequate containment, is secure, is protected from weather and is not located in an area within 30 m of a watercourse and has no direct drainage leading to a watercourse.

.8 Remove full disposal containers to the appropriate waste disposal facility on a regular basis.

.9 Handle wastes that require special handling requirements according to the appropriate local, provincial and federal legislation.

.10 Keep the staging area tidy and free of litter.

.11 Maintain house in good condition and mow land regularly (minimum 2/month in growth season)

3.6 RECREATIONAL VALUE

.1 Clearly delineate works using fencing and appropriate signage prior to commencement of construction in order to safely guide the public around the site.

.2 Limit access to the site to construction and pertinent personnel.

3.7 TOURSIM VALUE

.1 Clearly delineate the work areas using fencing and appropriate signage prior to commencement of construction.

.2 Limit access to the site to construction personnel.

.3 Designate access routes for construction vehicles from and to the construction area and speed limits will be established and adhered to as necessary.

3.8 RIPARIAN PROPERTY

.1 Install Sediment and erosion control measures prior to the commencement of construction work and in- water activities (cofferdam construction, etc.)

.2 In-water sediment/turbidity curtains shall be deployed in a manner that prevents entrapment of fish inside the curtain.

.3 The Cofferdams will be constructed of steel structures and clean rock fill and be designed to withstand maximum flood event expected during construction and work has been phased in order to ensure that the project site will continue to be able to pass flood flows.

.4 The area inside of cofferdams, if necessary, will be cleaned and restored during final site restoration; alternatively, the cofferdam footprint can be capped with clean rock, in order to mitigate turbidity from the former construction area as the areas are re-flooded. All debris on bed (including unused aggregate/concrete rubble) shall be completely removed and area restored to original state upon completion of work.

.5 Rip-rap for bank stabilization will consist of clean rock, free of fines.

3.9 LOCAL ECONOMY

.1 Clearly delineate the work areas using fencing and appropriate signage prior to commencement of construction.

.2 Limit access to the site to pertinent personnel

.3 Designate access routes for construction vehicles from and to the construction area and speed limits will be established and adhered to as necessary.

.4 Negotiate private land use directly with owners (ex. Campground, RV park or lodge)

3.10 LAND AND WATER ACCESS

.1 Clearly delineate the work areas using fencing and appropriate signage prior to commencement of construction in order to guide members of the public around the site.

.2 Limit access to the site to pertinent personnel.

.3 Designate access routes for construction vehicles from and to the construction area and speed limits will be established and adhered to as necessary.

.4 Maintain public access as per section 01 14 00 (work restriction) and 01 20 01 (site access)

3.11 AIR QUALTIY

.1 Develop and submit for review a Dust Management Plan and Fire Prevention and Preparedness Plan prior to construction.

.2 Use equipment and vehicles equipped with dust collectors and mufflers as appropriate.

.3 During concrete removal, tarps will be used to contain airborne dust particles.

.4 Apply water, at a minimum, on a daily basis, to inactive disturbed surface areas. Apply water more frequently if required to prevent the visible emissions of fugitive dust.

.5 Apply water to unpaved road used for vehicular traffic at a frequency sufficient to prevent the visible emissions of fugitive dust.

.6 Grade regularly and maintain unpaved roads to avoid washboarding and rutting that can increase fugitive dust emissions.

.7 Post speed limits throughout the facility to control fugitive dust on unpaved roads.

.8 Cover loads on haul trucks.

.9 During very windy conditions, avoid or reduce activity that generated fugitive material handling/transfer dust. If it is not possible to reschedule the activity, increase application of water for dust suppression.

.10 Consider a sprinkler or spray system for areas requiring frequent wetting.

.11 Apply water to open stockpiles on a daily basis when there is evidence of wind driven fugitive dust.

.12 Surround wetted stockpiles with sediment erosion control fencing.

.13 Spray materials with the potential to generate dust with water 15 minutes prior to handling and/or at points of transfer.

.14 Burning of waste materials is prohibited.

.15 Disturbed areas will be re-vegetated following a re-vegetation plan which will utilize native shrubs and trees, based on local conditions, to promote the quick re-growth of a natural habitat and minimize fugitive dust.

3.12 GROUNDWATER QUALITY

.1 Do not use herbicides in clearing of vegetation.

.2 During concreting, employ measures to reduce the potential for contamination.

.3 Wash-out stations for concrete trucks will be indicated by signage and located a minimum of 30 m from the river and in an area where appropriate precautions have been taken to contain wastewater and leftover concrete.

.4 Do not use local groundwater for construction activities and do not drill well for groundwater. If necessary, off-site water will be trucked in.

.5 Develop and submit for review to the Departmental Representative a spill response plan prior to the beginning of construction.

.6 Designate a temporary waste storage area for the storage of fuels, lubricants, etc. Maintain the area so as to prevent leaks, spills or damage/deterioration to waste containers, has adequate containment, is secure, is protected from weather and is not located in an area within 30 m of a watercourse and has no direct drainage leading to a watercourse.

.7 Locate emergency spill kits on site.

.8 Fully train the construction crew on the use of clean-up materials in order to minimize impacts of accidental spills.

.9 Monitor the area for leakage and in the event of a minor spillage halt the activity and implement corrective measures. Immediately report spills to the MOECP Spills Action Centre (1 800 268-6060) and the Departmental Representative.

3.13 SURFACE WATER QUALITY

.1 Develop and submit for review to the Departmental Representative a Surface Water, Erosion and Sediment Component Plan prior to construction activities.

.2 Be responsible to ensure that the measures chosen are appropriate for the site and are functioning as intended.

.3 Maintain and monitor sediment and erosion control measures daily, provide the results of monitoring, and ensure adjustments as needed are made on a continuous basis.

.4 No work will occur in or within 30 m of the water until the appropriate sediment and erosion control measures have been properly implemented. These will be designed to prevent the movement of suspended sediments and concrete outside of the work area.

.5 If sedimentation issues occur outside of the temporary work area, the cause of sedimentation must be identified and addressed to the satisfaction of the Departmental Representative.

.6 Should dust particles be created during concrete crushing, excavation, stockpiling etc. suppress them using the appropriate method (i.e. water spraying).

.7 Use small machinery to remove riparian vegetation

.8 Where possible, restrict vehicle traffic to access roads.

.9 Whenever possible, reduce bank erosion by leaving a minimum of 60 cm stump in place from trees removed along the shoreline.

.10 Ensure that new shoreline, created during re-profiling, is stable immediately following excavation. Use rip-rap free of fines.

.11 In-water activities with the exception of the construction of the cofferdams will take place in the dry and in an isolated area.

.12 Complete isolation of the work area using cofferdams and sediment curtains.

.13 Place rock on the shoreline approach for the construction of the granular cofferdams and access ramps. Following completion this rock will be removed, and shorelines reclaimed to pre-construction conditions or better.

.14 The temporary in-water work areas will then be dewatered, and the water returned to the river after undergoing treatment for suspended sediments. The water will be discharged at a location where every precaution has been taken to ensure that no introduction of sediments to occur and that returning water does not cause erosion or re-suspension of sediments. The water returning to the river needs to be of similar or better quality than the river itself in order to reduce potential impacts to water quality downstream.

.15 Monitor the drilling activities for the installation of the sheet pile cofferdam for suspended sediments and take measures, as needed, to prevent downstream migration of a sediment plume (i.e. tremie and turbidity curtains).

.16 Before beginning work on the Cofferdams, if required, the sluices in the existing dam would be opened as far as possible on the opposite side and closed on the work side in order to reduce water flow within the work area and minimize transportation of suspended sediments downstream.

.17 Use clean, washed rocks, free of fines in the construction of the cofferdams.

.18 The removal of the cofferdams will be completed with a downstream turbidity curtain in place. Water will be allowed to slowly enter the area that had been isolated by the cofferdams. The turbidity curtain will be left in place until the water suspended sediments settled and then be removed carefully to ensure that sediment trapped is not released downstream.

.19 Submit a drawing showing access ramps to the river. Minimize the access ramps and locate outside of identified exclusion zones.

.20 Use clean, washed, aggregates to construct access ramps.

.21 Machinery working in the temporary work area will be clean of mud and free of leaks.

.22 Fully remove access roads/ramps into the dewatered work area once the work is completed.

.23 Additional materials (i.e. rip-rap, filter cloth and silt fencing) should be readily available in case they are needed promptly for erosion and/or sediment control.

.24 Do not remove sediment fencing until the terrestrial vegetation has become re-established.

.25 Indicate wash-out stations for concrete trucks by signage. Locate wash-out stations a minimum of 30 m from the river and in an area where appropriate precautions have been taken to contain wastewater and leftover concrete.

.26 Store stockpiles of soil or fill material at least 30 m from the river, with the possible exception of clean rip-rap, and protect by silt fencing.

.27 Use no herbicides in clearing of vegetation.

.28 Dewater the temporary in-water work areas and return the water to the river after undergoing treatment for suspended sediments.

.29 Maintenance on construction equipment such as refueling, oil changes or lubrication will only be permitted in designated area located at a minimum of 30 m from the shoreline and outside of the drip line of trees to be retained and in an area where sediment erosion control measures and appropriate precautions will be made to prevent oil, grease, antifreeze or other materials from inadvertently entering the ground or the surface water flow.

.30 Locate emergency spill kits on site.

.31 Fully train the construction crew on the use of clean-up materials in order to minimize impacts of accidental spills.

.32 Monitor the area for leakage and halt the activity in case of a minor spillage and implement corrective measures. Report immediately spills to the MOECC Spills Action Centre (1-800-268-6060) and the Departmental Representative.

3.14 DRAINAGE AND FLOODING

.1 Prepare an Emergency Preparedness Plan to specify mitigation measures that will be undertaken in the event of an exceptionally large flood occurring during construction work and commissioning to ensure safety of workers, and persons and properties upstream and downstream of the dam.

3.15 SPECIES AT RISK

.1 Species At Risk (SAR) are identified in section 1.9.

.2 If SAR, species of conservation concern, or sensitive habitats are identified at, or near the work site, ensure proper authorizations have been obtained and mitigation measures put in place prior to starting work

.3 Inform workers on identifying Species at Risk and Species of Special Concern. If an unexpected rare plant or animal species are encountered, halt construction activities and inform the Departmental Representative who will contact Environment and Climate Change Canada and PSPC to provide advice on additional mitigation measures or permits which may be required. Do not approach or handle the species (i.e., do not harm or harass the species).

.4 Surround stockpiled materials by sediment control fencing to prevent turtle nesting.

.5 Use existing access roads as much as possible and post clearly speed limits on site access and construction roads to minimize the potential for road mortality

3.16 TERRESTRIAL HABITAT AND SPECIES

.1 Clearly demark work areas by fencing.

.2 Surround stockpiled materials by sediment control fencing to prevent turtle nesting.

.3 Use existing access roads as much as possible and post clearly speed limits on site access and construction roads to minimize the potential for road mortality.

.4 Should mammal, reptile or amphibian species be encountered during construction, immediately stop the construction activities until the animal has safely moved out of harm’s way. If an individual that is not a SAR needs to be moved it may be relocated to its appropriate habitat outside of the work area. Species

at Risk should only be handled by authorized personnel.

.5 Minimize the removal of natural vegetation.

.6 Install snow fencing outside of the drip line of trees not intended for removal to prevent soil compression, root damage and to minimize damages to branches.

.7 Prune branches of trees that overhang the work area to prevent unintentional harm.

.8 No grubbing of stumps will occur within the drip line of trees not intended for removal.

.9 Use small equipment in order to prevent harming woody vegetation not intended for removal.

.10 If possible, remove vegetation during the winter months to avoid impact to soil.

.11 Stockpiling of cleared vegetation or chips will be situated away from the water and outside of the drip lines of trees.

.12 Do not remove woody vegetation during the breeding bird season, unless a qualified biologist has searched the site for nests and concluded that no nests are present, no more than 7 days prior to clearing.

.13 When possible, complete work during daylight. If nighttime lights are used install them so as to illuminate the work area only to minimize impacts to nighttime activities of wildlife.

.14 Vehicles and equipment will have the appropriate mufflers installed to minimize sound disturbance to wildlife.

.15 Do not leave food scraps and garbage at the project site.

.16 Handle construction waste according to the Waste Management Plan.

.17 Install well keyed-in and maintained sediment fences along the shoreline which will also serve as barriers to keep turtles outside of the work area.

.18 Inform the construction crew of the potential for Blanding’s Turtles to occur, and other species identified in section 1.9. Avoid harming turtles. If turtles are in the way, wait for the turtle to pass. Snapping turtles can be moved if needed (but should

not be picked up by the tail or near the front half of the carapace).

.19 Limit speed of travel of vehicular traffic to low speed during mid-October to November (when turtles are moving towards wintering areas) and early spring (when they are leaving wintering areas for nesting sites).

.20 Wildlife and habitat related mitigation measures identified in contract documents and other measures proposed must be included in the site-specific EMP and accepted by the Departmental Representative.

3.17 SOIL AND SEDIMENT QUALITY

.1 Environmental Site Assessment done in support of the current project determined that there is a low probability of contamination by current and historical activities. If signs of contamination (e.g. odor, construction debris) are observed in soils or sediment during construction activities, the Contractor shall take appropriate measures to ensure no cross-contamination will occur according to the Ontario Environmental Protection Act O. Reg 153/04.

.2 Maintenance on construction equipment such as refueling, oil changes or lubrication will only be permitted in designated areas located at a minimum of 30 m from the shoreline and outside of the drip line of trees to be retained and in an area where sediment erosion control measures and other applicable precautions have been made to prevent oil, grease, antifreeze or other materials from inadvertently entering the ground or the surface water flow.

.3 Stockpiling (including debris from demolition and contained soil) will be done on an impermeable surface. No debris from demolition will be reused on the site.

.4 All equipment working in or near the water will be well maintained, clean and free of leaks.

.5 Avoid operation, storage, repairs and maintenance of machinery outside the delineated work areas.

.6 Store appropriate spill control materials and equipment on the construction site in order to address potential spills and properly train staff in their use.

.7 Use biodegradable hydraulic fluids for machinery that will be working in or around the river.

.8 Locate emergency spill kits on site.

.9 Fully train the crew on the use of clean-up materials in order to minimize impacts of accidental spills.

.10 Monitor the area for leakage and in the event of a minor spillage halt the activity and implement corrective measures. Report immediately spills the MOECP Spills Action Centre (1-800-268-6060) and the Departmental Representative.

.11 Store hazardous materials in a secure location and inspect the containment measures on a regular basis.

.12 Work with cement (or other grout) and the cleaning of cement handling equipment will occur in the dry (except for sheet pile cofferdam where containment curtain will be used), behind cofferdams. Store cement or grouting supplies in a dry location, under cover and away from the drainage zone and at least 30 m from the watercourse. Locate concrete washout stations at least 30 m away from the watercourse and in an area where appropriate precautions have been taken to contain wastewater and leftover concrete. Utilize containment measures for the on-site handling of wash water or other slurries. Inspect containment measures on a regular basis.

.13 Local soil will be stockpiled and re-used as opposed to bringing in soil from other locales. If outside material (e.g. top soil, sand) has to be used on the construction site, it will be reputably sourced.

.14 Store contaminated soil that is in excess on site for the shortest time possible, covered, and dispose of at an approved facility. Contaminated soil remaining in place on site will be capped with clean fill, asphalt or concrete paving to ensure there is no access to contaminated soil.

.15 Implement appropriate sediment and erosion control measures prior to commencement of work in or within 30 m of the water.

.16 Install heavy duty turbidity curtains downstream of the cofferdam.

.17 Properly installed sediment fencing along the shoreline will be used to contain particles which may enter the water.

.18 Maintain both the sediment fencing and the curtain.

.19 Monitor sedimentation outside of the sediment fencing and curtain throughout the day and include daily

photographs looking upstream, within and downstream of the work area (i.e. photograph water clarity each day prior to starting in-water works, a mid-day and again at the end of day). These photographs will serve as documentation that the sediment and erosion control measures are functioning.

.20 Provide additional monitoring during rain events.

.21 Ensure that the measures chosen are appropriate for the site and are functioning as intended.

.22 Spray water during concrete removal to prevent airborne dust dispersal.

.23 Minimize removal of riparian vegetation and complete removal using small machinery. Utilize existing road where possible.

.24 Whenever potential for bank erosion will be reduced by leaving a minimum of 60 cm stump in place from trees removed along the shoreline.

.25 Immediately stabilize the riparian area following excavation.

.26 In-water activities with the exception of the construction of the cofferdams will take place in the dry and in an isolated area.

.27 The in-water work areas will be dewatered, and water returned to the river after undergoing treatment for suspended sediments. Examples of treatments include: sediment bags at the end of the pump, rock check dams, straw bale/geotextile settling ponds or allowing the water to pass through a fully vegetated area.

.28 The water that is pumped from the isolated area may contain suspended sediments. Discharge the water at a location where every precaution has been taken to ensure that no introduction of sediments occurs. The water returning to the river needs to be of similar or better quality than the river itself.

.29 Ensure that the returning water does not cause erosion or re-suspension of sediments (i.e. must be returned in such a way to reduce the energy of water).

.30 Monitor the return of water to the river and be properly document.

.31 Access to the temporary in-water work area will be from one location and will be situated outside of identified exclusion zones.

.32 Use clean rock to construct the access ramp.

.33 Machinery working in the temporary work area will be clean of mud and free of leaks.

.34 Fully remove the access roads into the dewatered work area once the work is completed.

.35 Additional materials (i.e. rip rap, filter cloth and silt fencing) should be readily available in case they are needed promptly for erosion and/or sediment control.

.36 Do not remove the sediment fencing until the terrestrial vegetation has become re-established.

.37 During concreting pouring follow measures to reduce the potential for contamination.

.38 Indicate wash-out stations for concrete trucks indicated by signage. Locate stations a minimum of30 m from the river and in an area where appropriate precautions have been taken to contain wastewater and leftover concrete. Install erosion control structures. These structures are to be left in place until vegetation is re-established and/or exposed soils are stabilized.

END OF SECTION

PART 1 - GENERAL

1.1 DESCRIPTION

.1 This Section describes requirements for protection of archaeological and cultural resources that apply to the Work. These requirements apply to all Sections of this Specification, without limiting the conditions and approvals imposed by statute.

.2 Control Work to provide effective archaeological and cultural protection. Departmental Representative will monitor mitigation measures and will identify whenever such measures are found to be ineffective.

.3 Comply with environmental requirements of Contract Documents, applicable federal, provincial, and local statuses, acts, regulations, and ordinances of Agencies having jurisdiction.

1.2 MEASUREMENT AND PAYMENT

.1 No separate measurement for payment shall be made for items under this section. Include cost in the contract Lump Sum Amount.

.2 Payments related to this Section shall be as set out in Section 01 22 01 – Measurement and Payment.

.3 Upon discovery of a potential previously unknown cultural resource, the Contractor shall immediately cease the task underway in the area of the discovery (within 10 meters) such that the potential cultural resource is not disturbed further.

.4 The Contractor shall contact the Departmental Representative, advise of the discovery, provide photos, and a description of the finding. The Departmental representative will review the preliminary information reported by the Contractor and direct the Contractor on how to proceed.

.5 Upon cessation of the work, the Contractor will be eligible for task based standby payment while an archeological assessment is conducted. The Departmental representative will direct the Contractor when work in the affected area can resume.

1.3 DEFINITIONS

.1 Cultural Resource: any heritage or archeological artifacts, relics or antiquities including but not limited to:
  .1 Corner stones and their contents.
  .2 Buried artifacts including tools, stacked stones, dressed lumber, rough sawn lumber, round timbers, timber piles (round or squared off).
  .3 Remains and evidence of ancient persons and peoples including arrowheads, pottery, implements, shelters, clothing, etc.

.2 Character Defining Elements:_any architectural detail unique to a structure

1.4 CANAL REGULATIONS AND PERMITS

.1 "Historic Canal Regulations" apply to and govern work under this Contract.

.2 Do not mobilize or begin any work until Parks Canada Agency (PCA) issues a permit under Historic Canals Regulation (SOR93-220 Sections 11, 14 and 15).
  .1 Permit will not be issued before following submittals are submitted and accepted:
    .1 Site Specific Environmental Management and protection Plan (SSEMPP).
    .2 Site Specific Health and Safety Plan.
    .3 Site Layout Plan.
    .4 Dewatering Plan.
  .5 Change to project scope of work not assessed under site specific EMP and DIA will require review and acceptance by Departmental Representative and may require issuing a revised permit. The SSEMPP is a living document and may from time to time be updated to reflect changes in the nature of work. The Contractor is required to update the Environmental Management and Protection plan to reflect these changes, at no additional cost.

1.5 HERITAGE PROTECTION

.1 Trent-Severn Waterway, Lock 28 and the Dam at Lock 28 are Resources of National Heritage Value and have been designated by the Government of Canada as being of national historic and architectural significance.

.2 Preserve heritage elements of site by executing Work without damage to site features or character defining elements.

.3 Notify the Departmental Representative and PCA's Environmental Authority immediately if heritage items are damaged.

.4 Employ minimal intervention approach for all Work.

.5 Access roads, staging areas, and work pads require review and approval.

.6 Damage to heritage elements will not be tolerated.

.7 Ensure appropriate supervision of work, adequate training for workers, and other necessary precautions to protect existing structures.

.8 Ensure that all personnel working on site undergo a heritage induction to clearly identify the value of the place and how to avoid inadvertent impacts on cultural resources (known and unknown).

.9 Notify the Departmental Representative immediately where reasonable concern exists that damage may result from work.

.10 The Contractor may propose alternative work methodologies, subject to approval by the Departmental Representative.

.11 Protect possible archeological and cultural resources by excavating only to limits indicated.
.1 Excavation beyond indicated limits requires acceptance by departmental representative.

1.6 HISTORICAL, ARCHEOLOGICAL CONTROL

.1 Provide protection for historical, archeological, cultural and biological/vegetation resources in accordance with approved SSEMPP.

.2 Accommodate PCA Cultural Resource Management (CRM) representative's needs for documentation of existing structures after discovery.

.3 Include methods to ensure protection of known or discovered resources and identify lines of communication between Contractor personnel and the Departmental Representative to address situations where such resources not known to be on site are discovered during construction.

.4 Should any archeological or cultural resource be discovered during excavation or demolitions works, stop work immediately. Contact the Departmental Representative for direction prior to continuing work.

1.7 NOTIFICATION

.1 Departmental Representative will notify Contractor in writing of observed non-compliance with Federal, Provincial, or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Management Plan.

.2 Contractor: after receipt of such notice, inform Departmental Representative of proposed corrective action and take such action for approval by Departmental Representative.
.1 Take action only after receipt of written approval by Departmental Representative.

1.8 ACTION AND INFORMATION SUBMITTALS

.1 Prepare Historical, Archaeological, Cultural Resources, Biological Resources and Wetlands Plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands as part of SSEMPP.

PART 2 - PRODUCT

2.1 MATERIALS

.1 Use materials and products in accordance with OPSS.MUNI 805, November 2018.

PART 3 - EXECUTION

3.1 MITIGATION MEASURES

.1 Departmental Representative may monitor and record some or all aspects of excavations, site access routes, and disturbances to soil overburden due to equipment and general work operations.

.2 If human remains are discovered, notify immediately local police, the coroner's office, the Registrar of Cemeteries and the Departmental Representative.

.3 Parks Canada has conducted a heritage recording of the dam and landscape. Additional recordings of the submerged components will be required once dewatering occurs but prior to demolition/excavation. Departmental Representative will clearly delineate any archaeologically sensitive areas and photo-document this activity for Parks Canada records. These areas will be deemed no-go zones for staging, vehicular traffic and machinery during the survey.

.4 Ensure that all personnel working on site undergo a heritage orientation to clearly identify the value of the place and how to avoid inadvertent impacts on cultural and archeological resources (known and unknown).

.5 Main vehicular access routes and staging areas will be restricted to roadways and parking lots. If this is not possible, the use of protective covering such as geotextile protective mats with a wood chip lift or granular "A" gravel is required. All protective covering must be removed following construction and the area restored to pre- construction state. Excavation is not permitted during installation or removal of protective covering.

.6 Should any historical dam(s) be exposed during de-watering activities, cease work and notify the Departmental representative immediately.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

.1 This Section references to laws, by laws, ordinances, rules, regulations, codes, orders of Authority Having Jurisdiction, and other legally enforceable requirements applicable to Work and that are; or become, in force during performance of Work.

1.2 REFERENCES TO REGULATORY REQUIREMENTS

.1 Perform Work in accordance with National Building Code of Canada (NBC) 2015, National Fire Code of Canada (NFC) 2015 and Ontario Building Code (OBC) 2019 including amendments up to tender closing date and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply.

.2 Specific design and performance requirements listed in the specifications or indicated on the Drawings may exceed the minimum requirements established by the referenced Building Code; these requirements will govern over the minimum requirements listed in the Building Code

.1 Meet or exceed requirements of:

.1 Contract documents.

.2 Specified standards, codes and referenced documents.

1.3 MEASUREMENT AND PAYMENT

.1 No separate measurement for payment shall be made for items under this section. Include cost in the contract Lump Sum Amount.

.2 Payments related to this Section shall be as set out in Section 01 22 01 – Measurement and Payment.

1.4 HAZARDOUS MATERIAL DISCOVERY

.1 Immediately notify Departmental Representative when any unknown hazardous material is encountered during demolition work.

1.5 FLOATING PLANT

.1 Mark floating equipment with lights in accordance with the Collision Regulations under the Canada Shipping Act.

1.6 NAVIGATION BUOYS AND MARKERS

.1 Navigation hazard buoys and markers used on this project are to conform to the Canadian Coast Guard-Canadian Aids to Navigation System (TP 968) and to the Transport Canada – An Owner's Guide to Private Buoys (TP 14799E).

.2 Provide a Navigation Plan for temporary works related to the dewatering and diversion as approved by Transport Canada and acceptable to the Agency and Departmental Representative. Construct signage to the requirements of Section 10 14 55 – Safety Signage. Install and maintain signage and buoys during the course of construction.

1.7 NATIONAL PARKS ACT

.1 For projects located within boundaries of National Park, perform Work in accordance with National Parks Act.

1.8 RELICS AND ANTIQUITIES

.1 Relics and antiquities, and items of historical or scientific interest such as cornerstones and contents, commemorative plaques, inscribed tables, and similar objects found on site shall remain the property of Parks Canada. Protect such articles and request direction from Departmental Representative.

.2 Should historic objects be uncovered during excavating, notify the Departmental Representative. Do not resume work until directed to by the Departmental Representatives.

.3 Archaeology staff from Parks Canada will monitor the project work and may require temporary stop of work to carry out site investigations.

1.9 WATER QUALITY

.1 The Contractor shall not impact the quality of surface water or groundwater.

.2 The Contractor shall obtain all respective permits and approvals to be able to undertake the work.

1.10 QUALITY ASSURANCE

.1 Regulatory Requirements: Except as otherwise specified, Contractor shall apply for, obtain, and pay all fees associated with, permits, licenses, certificates, and approvals and applicable taxes required by regulatory requirements and Contract Documents, based on General Conditions of Contract and the following:
  .1 Regulatory requirements and fees in force on date of Bid submission, and
  .2 Any change in regulatory requirements or fees scheduled to become effective after date of tender submission and of which public notice has been given before date of tender submission.
  .3 Store Hazardous Materials in secure areas on impermeable pads, provide berms if necessary.

PART 2 - PRODUCT

2.1 EASEMENTS AND NOTICES

.1 PCA will obtain permanent easements and rights of servitude that may be required for performance of Work.

.2 Contractor shall give notices required by regulatory requirements.

2.2 PERMITS

.1 Tree Cutting:
  .1 Make application and obtain approval and related permit from the municipality of Trent Lakes and Selwyn and county of Peterborough regarding any tree cutting outside PCA property and the indicated work limits.
  .2 Contractor to abide by all requirements of the permit.

.2 Water Taking:
  .1 Make application and obtain approval and related permit from the Ministry of the Environment, Conservation and Parks for removal of water from a watercourse or groundwater for a withdrawal greater than 50,000 lpd under Ontario Regulation 387/04. Dewatering of the waterway for construction will require a Permit to Take Water (PTTW). Where groundwater is withdrawn from wells adjacent to the work area to control seepage, obtain approval from the MECP to discharge directly to the watercourse beyond the active work area.

.2 Contractor to abide by all the requirements of the permit.

.3 Department of Fisheries Review:
.1 The PCA will receive confirmation from Department of Fisheries and Oceans Canada(DFO) as part of the Environmental Assessment (EA) screening that the dam reconstruction as described in the EA and these specifications is not likely to result in impacts to fish and fish habitat.
.2 Should the Contractor approach and methodology for the reconstruction of the dam (including temporary works) differ from the description in the EA and these specifications, or if the proposed foot print of the temporary work goes beyond the indicated work limit, or if the proposed temporary works cannot meet applicable federal, provincial or local regulations.

2.3 LOCAL AUTHORITIES

.1 Contractor must comply with by-laws and regulation of local authorities having jurisdiction, including but not limited to:
.1 Noise by-laws;
.2 Traffic control;
.3 Load restrictions;
.4 Work hours.

.2 Contractor to obtain exemption from local authorities when required to complete the work.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not used

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Inspection and testing, administrative and enforcement requirements.

.2 Air entrainment testing, slump testing, casting of 7 day break and 28 day break cylinders, strength testing of cylinders and review/approval of mix designs.

.3 Validation of construction elevations by an OLS and CLS surveyor.

1.2 DEFINITIONS

.1 Certificate of Conformance: document issued by the Quality Verification Engineer (QVE) confirming that specified components of Work are in General Conformance with requirements of Contract Documents.

.2 General Conformance: means that, in the opinion of a Professional Engineer, the standard of construction work fulfills essential requirements of Contract Documents, and has been done in accordance with normally accepted industry standards, and will perform its intended function.

.3 Interim Inspection: an inspection confirming that specified components of Work are in General Conformance with Contract Documents. Written confirmation must be submitted to Departmental Representative before the Contractor can proceed to next stage of work.

.4 Quality Control: a system or series of activities carried out by Contractor to ensure that the final product and materials supplied to Parks Canada meets the specified requirements.

.5 Quality Control Administrator (QCA): Contractor's representative responsible for monitoring and ensuring Quality Control compliance.

.6 Quality Verification Engineer (QVE): one or more Professional Engineer(s) licensed in the Province of Ontario designated by the Contractor to provide the QVE services specified in the Contract Documents. The QVE will be responsible for certifying that the work is in General Conformance with Contract documents and for issuing Certificate(s) of Conformance as required. QVE to have experience directly related to Work for which Certificate of Conformance will be issued.

1.3 MEASUREMENT AND PAYMENT

.1 No separate measurement for payment shall be made for items under this section. Include cost in the contract Lump Sum Amount.

.2 Payments related to this Section shall be as set out in Section 01 22 01 – Measurement and Payment.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 – SUBMITTAL PROCEDURES.

.2 Develop and submit a Quality Management program (QMP)for quality control activities in Contract and provide the necessary staff and resources. Program to include:
- .1 Retain the services of a QVE and QVE delegates as required.
- .2 Assign a Quality Control Administrator (QCA)
- .3 Retain the services of an independent Testing and inspection Firm.
- .4 Inspection and Testing Plan
- .5 Make available and submit all QC documentation upon request by Departmental Representative.
- .6 Ensure Interim Inspections are completed and Certificates of Conformance are submitted, where specified, prior to proceeding to the next stage of Work. Use the same QVE for Interim Inspections as for Certificate of Conformance.
- .7 Detail monitoring, tests, stop points, result analysis, corrective measures and all pertinent information for quality control and management.
- .8 Provide the Quality Management Program within 10 days of contract award and update quality control plan as required by the works.

.3 During the course of Work, submit all QC inspection activities and associated records in accordance with the quality control requirements of the Contract Documents. In particular, the Contractor should ensure that the following items are in accordance with the Contract Documents:
- .1 Submission of materials-related documentation, mix designs, samples, etc. prior to proceeding with fabrication and construction of particular elements of work.
- .2 Environmental conditions for material placement, including but not limited to, temperature and weather constraints and placement restrictions.
- .3 Construction methods for material placement and/or removal.

.4 Provision of environmental protection of materials and elements of work and/or maintenance of environmental conditions after material placement including but not limited to: curing of concrete, cold weather protection, etc.
.5 Any other relevant information and records requested by Departmental Representative.
.6 The above is not an exhaustive list and it is the Contractor's responsibility to ensure that all quality control requirements are in accordance with the Contract Documents.

.4 Use only personnel/firms identified in the submissions, or in other forms of communication when permitted by Contract Documents, for the indicated Certificates of Conformance, Interim Inspections, and other quality control activities.
.1 Submit in writing to the Departmental Representative, revisions to the designated QVE at least two weeks prior to the activity for which the substituted personnel will be required.

1.5 INSPECTION

.1 The Departmental Representative reserves the right to inspect the work executed by the Contractor at site. If the executed work fails to conform to the standards set forth in this document or any revisions/modifications thereof, the Contractor shall rectify the work as directed, at his own risk and cost within the time frame set by the Departmental Representative. Failure to comply with this requirement shall result in non-conformance and the Departmental Representative, in such case, reserves the right to stop the Work, for which the Contractor shall be solely liable and responsible.

.2 Allow Departmental Representative access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.

.3 Give timely notice requesting inspection if Work is designated for special inspections or approvals by the Departmental Representative, or law of Place of Work.

.4 If Work has been covered prior to inspection or approval, uncover such Work, have inspections satisfactorily completed and make good such Work. Pay costs for uncovering and making good Work that was covered prior to inspection or approval.

.5 Departmental Representative will order part of Work to be examined if Work is suspected to not be in accordance with Contract Documents. If, upon examination, such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. If such Work is found in accordance with Contract Documents, Departmental Representative shall pay cost of examination and replacement.

.6 Prior to watering up the completed work, the Departmental Representative shall verify that all commissioning plan activities and checklists have been completed.

1.6 INDEPENDENT INSPECTION AGENCIES

.1 The Contractor shall engage third party (independent laboratory) for inspection/testing of material samples, civil works, metal works and finishes, as and when required.

.1 Independent Testing and Inspection firm shall provide all test results directly to the Departmental Representative, with copy to the Contractor, in order to substantiate the level of Quality and workmanship is in compliance with the specifications and standards provided with the Contract Documents.

.2 Independent Testing Firm shall be responsible for providing all necessary resources including labour, apparatus and testing facilities required for laboratory and field-testing.

.2 The Departmental Representative may engage from time to time, its own third party for inspection/testing of material samples, civil works, metal works and finishes, as and when required.

.3 Present an Inspection and Test Plan (ITP) all in accordance with the Contractor’s Quality Management Program (QMP) to ensure there are no compromises in the quality standards set forth in the Contract Documents. The Departmental Representative reserves the right to audit the Contractor’s Quality Management Plan & System.

.4 The Inspection and Testing Plan must identify hold, witness, inspection, record, and report points. The Plan must identify the specified acceptance criteria and demonstrate how this criteria has been achieved with supporting documentation. It must also identify which organization is required at each point of the ITP as well as their respective responsibilities.

.5 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.

.6 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Departmental Representative at no cost to Departmental Representative. Pay costs for retesting and re-inspection.

.7 The Contractor shall also be responsible for its own third party inspection and testing of manufacturing and supply items such as handrails, mechanical lifting equipment, stop logs, welding and finishing works etc. and provide test results as evidence to the Departmental Representative, to substantiate such inspection and test results are in accordance with the norms specified in this document.

1.7 ACCESS TO WORK

.1 Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants.

.2 Co-operate to provide reasonable facilities for such access.

1.8 PROCEDURES

.1 Notify Departmental Representative 3 working days in advance of requirement for tests, in order that attendance arrangements can be made.

.2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in orderly sequence to not cause delays in Work.

.3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

.4 The Contractor is responsible for all coordination with its selected Independent Testing and Inspection Firm and QVE for scheduling required inspection and testing at site in accordance with the provisions of the Contract Documents.

1.9 REJECTED WORK

.1 Remove any and all defective or non-conforming work, whether the result of poor workmanship, use of defective products or damage and whether incorporated

in Work or not, which has been rejected by the Departmental Representative as failing to conform to the Contract Documents. Replace or re-execute that work in accordance with the standards set forth in the Contract Documents.

.2 Make good other Contractor's work damaged by such removals or replacements promptly.

.3 If in opinion of Departmental Representative it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Departmental Representative will deduct from Contract Amount difference in value between Work performed and that called for by Contract Documents, amount of which will be determined by Departmental Representative.

1.10 REPORTS

.1 Submit an electronic copy of inspection and test reports to Departmental Representative.

.2 Provide copies to manufacturer, fabricator or subcontractor of material being inspected or tested.

1.11 QUALITY VERIFICATION SERVICES

.1 The QVE shall:
- .1 Issue Certificates of Conformance as indicated.
- .2 Conduct Interim Inspections where required pursuant to the Contract Documents and issue written confirmation of conformance to the Departmental Representative following an interim inspection.
- .3 Include time, date and components inspected for Interim Inspections.

.2 Do not delegate any activity that Contract Documents require QVE to "witness". For all other activities, QVE may delegate the function to another person where it is consistent with prudent engineering practice to do so, and function is performed under supervision of QVE.

.3 Submit Certificates of Conformance, with reference to the applicable Working Drawings and other Contract Documents, to Departmental Representative at the milestones indicated. Submit Certificate(s) of Conformance within 24 hours of completing the Work described in the Certificate of Conformance and prior to commencing subsequent stages of Work. Where Interim Inspections are specified, do not proceed to the next stage of work until a written confirmation has been issued to the Departmental Representative by the QVE.

Make available copies of the written confirmation to Departmental Representative upon request.

.4 QVE to seal, sign and date Certificates of Conformance indicating that construction of Work is in General Conformance with the stamped Contract and Shop Drawings and requirements indicated. Do not include conditions or limitations as part of Certificate of Conformance or written confirmation to proceed following an Interim Inspection. Append any amendments to Contract Documents accepted by Departmental Representative, and related to Certificate of Conformance.

.5 Seek clarification of requirements from Departmental Representative if QVE is prevented from issuing written confirmation following an Interim Inspection, or a Certificate of Conformance, because of lack of clarity of Contract Documents.

1.12 SPECIFIC TEST

.1 Refer to pertinent sections, norms and standards for specific testing requirements.

PART 2 - PRODUCT

2.1 NOT USED

.1 Not used

PART 3 - EXECUTION

3.1 COMMISSIONNING

.1 Commissioning is an integral part of the Quality Control Program. Refer to section 01 91 13 - General Commissioning (CX) Requirements.

END OF SECTION

PART 1 - GENERAL

1.1 DESCRIPTION

.1 Work under this section relates to condition surveys and monitoring of structures and buildings which are adjacent to the construction site, including the Lock structures, and which may be affected by excavation, dewatering and slope stabilization works and vibration producing activities (such as pile driving, sheet pile driving/vibrating, concrete demolition work, excavation of frozen ground, and operation of heavy construction equipment)

.2 The Contractor is advised that structures, buildings and water supply wells are located close to the proposed work and that construction activities are to be conducted in such a manner to preclude damage to these structures, buildings and wells. The Contractor shall be responsible for any damage caused by their activities.

.3 The Contractor shall undertake environmental monitoring of the sediment and erosion control system including water quality (turbidity and pH) of discharge from dewatering operations. Additional monitoring upstream of the work area must be undertaken daily in order to confirm background turbidity levels. Turbidity and pH levels must also be taken and recorded daily at the locations identified in the SSEMP.

.4 The scope of work described in this section is a minimum requirement for conducting a condition survey and monitoring of the work. The Contractor’s temporary works Design Engineer together with the Contractor’s Movement Monitoring Specialist are to review and advise the Departmental Representative on movement and vibration criteria and any additional monitoring requirements.

.5 The monitoring work under the present scope only covers the construction area and immediate surroundings. The Contractor shall take full responsibility for other areas as part of their construction operation including haul routes.

1.2 RELATED REQUIREMENTS

.1 Section 02 41 16 - Structure Demolition

.2 Section 31 23 16.26 - Rock Removal

.3 Section 35 20 22 - Dewatering and Diversion

.4 Sections 35 62 16 – Cofferdams

1.3 MEASUREMENT AND PAYMENT PROCEDURES

.1 There shall be no separate measurement for payment for the work under this Section. Include cost in the contract Lump Sum Amount.

.2 Payment shall be made as set out in Section 01 22 01 – Measurement and Payment.

1.4 INDEPEDENDENT INSPECTION FIRMS

.1 An Independent Inspection/Monitoring Firm(s) shall be retained by the Contractor for the purpose of inspecting and/or monitoring portions of Work as described in this section. Cost of such services will be borne by the Contractor.

.2 The Independent Inspection/Monitoring Firm(s) team shall be qualified and competent in:
.1 Performing condition surveys;
.2 The determination of allowable movement including displacement and vibration at structures and embankments;
.3 The protection of groundwater wells;
.4 The establishment of measurement procedures and their implementation;
.5 Monitoring and reporting.

.3 The Condition Survey shall be undertaken by a qualified and competent inspector.

.4 If requested by the Departmental Representative, submit the inspector and monitoring specialist qualification and experience.

1.5 DEFINITIONS

.1 Movement Monitoring Specialist: refers to the independent inspection/monitoring firm which is responsible for the work under this section

.2 Temporary works Design Engineer: refers to the engineer retained by the Contractor to design and oversee the construction of temporary works such as water diversion and cofferdam structures, stabilization (shoring) walls and any other temporary works required to complete the work under the Contract.

1.6 CONSTRUCTION CONTROL AND MONITORING

.1 At least 30 days prior to start of work, the Contractor shall submit their Construction Control and Monitoring (CCM) plan. The plan shall be prepared in conjunction with the work area dewatering and water diversion construction plans, the excavation and stability wall construction plans, demolition plan and environmental management plan for sediment and erosion control

.2 As a minimum the CCM plan is to cover:
- .1 The format and extent of the Condition Survey;
- .2 The methodology to be used to monitor existing cracks and potential movement and vibrations in existing buildings and other structures
  - .1 MTO bridge
  - .2 Up to 5 cabins on south side
  - .3 Up to 2 buildings in the RV park/Campground
  - .4 3 other buildings as required (for example: Burleigh Falls Inn and lovesick campground administration building)
  - .5 Existing dam
  - .6 Other structures as deemed pertinent by contractor
- .3 The extent and methodology for soil movement monitoring program at existing structures and embankments, including establishment of critical movement criteria, type of monitoring equipment and frequency of measurement.
- .4 The vibration monitoring program, including influence vibration zone, safe and critical vibration levels and anticipated vibration levels at the closest structure, including type of monitoring equipment and frequency of measurement.
- .5 The turbidity control and drainage water as part of the sediment and erosion control plan.
- .6 Measures to protect existing groundwater wells and their services.

.3 Prior to commencement of the work meet with Departmental Representative to discuss the CCM plan, report format, report frequencies, emergency report and distribution list.

1.7 NOISE MONITORING

.1 Contractor is to install noise monitoring stations at Burleigh Falls Inn, north of lockstation and Lovesick Lake Campground. Exact location and details of monitoring will be finalized on site.

.2 The Noise monitoring equipment shall be capable of:

.1 Measuring, recording and storing information of peak noise event.
  .1 Peak noise level per hour (records: dBA, time and date)
  .2 Incidences of noise above 85 dB (records: dBA, time and date)

1.8 GROUNDWATER WELL MONITORING

.1 The Contractor is to install two monitoring wells near the excavation area. The wells are to have a 50mm diameter casing complete with protective capping and PVC screen with no. 10 slot. Exact location and details of monitoring will be finalized on site.

1.9 TURBIDITY CONTROL AND DRAINAGE WATER

.1 The Contractor shall undertake quality (turbidity) monitoring of any water discharge to a receiving stream as part of their sediment and erosion control plan as set out in Section 01 35 43 – Environmental Procedures.

1.10 CONDITION SURVEY

.1 Prior to commencement of the work, a Pre-Construction Condition Survey Report of adjacent properties and structures, within 50 m of the defined construction limit at a minimum that may be affected by the work under this contract shall be submitted by the Contractor.

.2 The Condition Survey shall be undertaken by the Contractor’s qualified inspector together with the Departmental Representative, private landowners and Township/municipality representatives.

.3 The survey shall include the location and condition at adjacent properties including Parks Canada property located outside of the Contract Limits of work of: buildings; structures; underground structures; and utility structures.

.4 Condition Surveys are to be performed for all building and structures located within 40 metres from the edge of excavation and dewatering work, and/or 50 metres from vibration producing activities. As a minimum, the following properties and structures are be surveyed:
  .1 Trent-Severn Waterway (TSW) property including lock chamber and retaining walls, gates and lock control building and approach walls
  .2 Burleigh Falls Inn, parking, gas station and Market at Burleigh Falls convenience store.

.3 Cabins upstream of existing dam on south side
.4 Lovesick campground buildings (permanent and temporary) within 10 m of contractor-negotiated access and within 10m of work area.
.5 Highway 28 Bridge downstream of dam

.5 Furthermore, Condition Survey is to be performed for:

.1 Highway 28 100m in both directions form the bridge downstream of dam.
.2 Township and municipalities roads used for hauling.
.3 Staging and material storage areas.
.4 Shoreline at edges of construction areas.

.6 The Contractor shall perform a monthly inspection of the haul routes and report their findings to the Departmental Representative. Repair and make good any damage to the satisfaction of the Local Authorities having jurisdiction.

.7 Upon completion of the work under the contract a Post-Construction Condition Survey shall be performed on all properties, buildings or structures that were surveyed as part of the Pre-Construction Condition Survey. The survey needs to focus on the same issues that were identified under the original survey, plus any new issues that may have developed during the construction period.

1.11 CONDITION SURVEY REPORT

.1 Prepare and submit a DRAFT Condition Survey Report for review and approval by the Departmental Representative within 10 days of construction commencement.

.2 Revise as required by the Departmental Representative and submit Final version of report.

1.12 MONITORING

.1 The Contractor will be responsible to carry out monitoring of Parks Canada land and assets. Monitoring work is to include:
.1 Monitoring of cracks in buildings and other structures which were identified as part of the Pre-Construction Condition Surveys;
.2 Movement monitoring of existing dam
.3 Vibration (seismographic) monitoring.
.4 Time lapse photography of the project from upstream and downstream of the dam. Two cameras must be positioned with a clear view of the dam and take high resolution photos every hour.

These photos must be combined together to form a time lapse movie of the construction from start to finish. The photos must be stored remotely and accessible online (internet) by the Departmental Representative.

.2 Cracks in buildings and structures monitoring:
- .1 Displacement monitoring gauges shall be installed across any significant existing crack to monitor for any additional building/structure distress due to work under this contract.
- .2 Location and number of gauges will be established by the Contractor and the Departmental Representative.
- .3 Gauges shall be read prior to commencement of construction activities and shall continue on a weekly basis until the completion of vibration producing construction activities.
- .4 The Departmental Representative is to be advised of any significant crack displacement detected by the monitoring gauges.

.3 Movement monitoring:
- .1 Existing dam:
  - .1 Install monitoring points along the concrete gravity dam (north and south, and sluiceways) The monitoring points should be spaced at 5 metres (max).
  - .2 The monitoring points are to be durable, not interfere with the operations of the lock or construction activities, and ensure accurate and repeatable readings.
- .2 The work also includes the construction of two (minimum) reference monuments, from which the monitoring points can be easily surveyed. If acceptable, these reference monuments may also serve as temporary bench mark for the construction.
- .3 Survey work for the movement monitoring is to have an accuracy of +/- 2 mm in the x, y, and z planes.

.4 Movement monitoring schedule:
- .1 Pre-construction: Initial measurements are to be taken before any work is started. Initial readings are to be taken on two different days, and results should be identical.
- .2 Construction: Measurements are to be taken on a daily basis during excavation, anchoring (drilling and tensioning), demolition, backfill and compaction work near the structures (within 10 m).
- .3 Abnormal conditions: Measurements are also to be taken under flood condition, after an earthquake

and under ice cover conditions extending to the structure.

.4 Post-construction activities: Measurements can be reduced to a bi- weekly basis for the first two weeks following the completion of the activities listed above. If no movement has been observed during this period, the monitoring can be discontinued until the next activity.

.5 Construction and post-construction activities: The Contractor will undertake daily visual inspection of the areas being monitored. The visual inspection shall continue until substantial completion of the work.

.5 Monitoring criteria: The movement criteria given below are nominal criteria and need to be reviewed and confirmed by the Monitoring Firm and temporary works Design Engineer:

.1 Total movement of 5 mm at any monitoring point - stoppage of work and review of construction procedure including a condition assessment of the Dam

.2 Total movement of 10 mm at any monitoring point - stoppage of the work, add, adjust, replace or repair damaged and weakened elements of stabilization (shoring) system or modify work procedure. A condition assessment of the structure

.6 If at any time the dam or the lock entrance walls exhibit signs of distress, all work is to stop, the situation assessed and modification made to the stabilization (shoring) system or to the work procedure

.7 Reporting:

.1 The Monitoring Firm shall provide a written record of findings including new data and its interpretation including other figures and graphs. The record shall be continuous and shall be provided within 24 hours of the measurements being taken.

.2 The Contractor Design and Monitoring Specialist shall provide recommendations based on the findings to the Departmental Representative.

.3 The report shall be clear and concise and be acceptable to the Departmental Representative.

.4 Action requirements by the Contractor shall be clearly defined with schedule of implementation.

.5 An addendum to the report shall be made by the Monitoring Engineer based on the result of the action taken by the Contractor to address the construction issue.

.8 Vibration (Seismograph) monitoring:

.1 The monitoring specialist shall:
  .1 Establish vibration influence zones and safe vibration levels and develop the Contractors vibration monitoring program for the existing dam (minimum 2 locations), and other structures as required (minimum 2 other structures).
.2 During vibration producing activities, the Contractor shall monitor vibration levels, and shall not exceed the established safe level to preclude damage to nearby structures.
.3 The vibration monitoring equipment shall be capable of:
  .1 Continuous recording of peak particle velocity.
  .2 Providing permanent record of the entire vibration event.
  .3 Providing an alarm when vibration limit exceed the established safe vibration level.
  .4 Being remotely monitored by the Monitoring Specialist.
.4 Copies of all vibration records and associated construction activities (pile driving, sheet pile driving/vibrating, concrete demolition work, excavation, and operation of heavy construction equipment) data shall be provided to the temporary works Design Engineer and Departmental Representative on a daily basis.
.5 Reporting:
  .1 The Monitoring Firm shall provide a written record of findings including new data and its interpretation including other figures and graphs. The record shall be continuous and shall be provided within 24 hours of the measurements being taken.
  .2 The Contractor Design and Monitoring Specialist shall provide recommendations based on the findings to the Departmental Representative.
  .3 The report shall be clear and concise and be acceptable to the Departmental Representative.
  .4 Action requirements by the Contractor shall be clearly defined with schedule of implementation.
  .5 An addendum to the report shall be made by the Monitoring Specialist based on the result of the action taken by the Contractor to address the construction issue.
.6 Take appropriate measures to reduce movement and vibration to adjacent properties and structures. If ground movement or if vibration measurements exceeds set criteria, immediately stop all

construction activity and inform Design engineer and Departmental Representative of the situation. Provide and implement remedial action to rectify the situation. Obtain written permission from Departmental Representative prior to resuming construction activities.

.7 Immediately repair any damage to any adjacent structure to the satisfaction of the Departmental Representative.

.9 Noise monitoring

.1 During noise producing activities, the Contractor shall monitor noise levels and abide with noise levels set in 01 14 00 – WORK RESTRICTIONS.

.2 Summary of noise records and associated construction activities (pile driving, sheet pile driving/vibrating, concrete demolition work, excavation, and operation of heavy construction equipment) shall be provided to the Departmental Representative on a daily basis during high noise activities and weekly basis otherwise. Noise monitoring findings shall also be part of the EMP monitoring and reporting at each bi-weekly meeting.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used

PART 3 - EXECUTION

3.1 ADJUSTMENTS

.1 Monitor stabilization / shoring system performance and maintain its effectiveness by making adjustments, replacing or repairing damaged and weakened elements of system until substantial completion of project

END OF SECTION

PART 1 - GENERAL

1.1 MEASUREMENT AND PAYMENT

.1 No separate measurement for payment shall be made for items under this section. Include cost in the contract Lump Sum Amount.

.2 Payments related to this Section shall be as set out in Section 01 22 01 – Measurement and Payment.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - SUBMITTAL PROCEDURES.

- .1 Heater numbers, types, locations and capacities.
- .2 Fan numbers, types, locations and capacities,
- .3 Number and location of fire extinguishers.
- .4 Shop drawings of enclosures.
- .5 Location and type of electrical and communication services including any relocation of existing utilities, services, and temporary supports.
- .6 Location, type and service for sanitation facilities.

1.3 INSTALLATION AND REMOVAL

.1 Provide temporary utilities controls in order to execute work expeditiously.

.2 Remove from site all such work after use.

.3 Notify Departmental Representative and utility companies of intended interruption of services and obtain requisite permission.

1.4 DEWATERING

.1 Provide temporary drainage and pumping facilities to keep excavations and site free from standing water. Refer to Section 35 20 22 - DEWATERING.

.2 Provide standby equipment (generator and pumps) to ensure continuous and safe operation of dewatering works.

1.5 WATER SUPPLY

.1 Provide continuous supply of potable water for construction use.

.2 Arrange for connection with appropriate utility company and pay costs for installation, relocation, maintenance and removal.

.3 Pay for utility charges at prevailing rates.

1.6 TEMPORARY GAIN HEATER

.1 Temporary gain heaters to be switched on/off at the request of departmental representative.

.2 Contractor to pay energy cost for temporary gain heaters.

1.7 HEATING EQUIPMENT

.1 Use heater equipment type acceptable to the Departmental Representative.

.2 Heating fuels:
- .1 Use electrical, gas, diesel oil or other fuels acceptable to the Departmental Representative.
- .2 Fuel Storage: to requirements of Fire Commissioner of Canada. Fuel storage is to be located away from domestic water wells, water course, and sediment settling pond or any other water surfaces. Fuel storage location to be approved by the Departmental Representative.
- .3 Heating Equipment Refueling and Containment: Equipment that needs to be located near open water or within the excavated area is to be placed in a containment system which can contain any spillage or leaking of fuel. Containment system to be approved by Departmental Representative.
- .4 Ensure that heating requirement is met by providing, at optimum efficiency of equipment, capacity of 125% of heat requirement and sufficient number of standby heaters ready for use on site.
- .5 Vent exhaust of heating equipment to outside of housing and well clear of combustible materials and air intakes.

1.8 TEMPORARY HEATING AND VENTILATION

.1 Provide temporary heating required during construction period, including attendance, maintenance and fuel.

Refer to Section 01 56 00 - TEMPORARY BARRIERS AND ENCLOSURES.

.2 Construction heaters used inside building must be vented to outside or be non-flameless type. Solid fuel salamanders are not permitted.

.3 Provide temporary heat and ventilation in enclosed areas as required to:
- .1 Facilitate progress of Work.
- .2 Protect Work and products against dampness and cold.
- .3 Prevent moisture condensation on surfaces.
- .4 Provide ambient temperatures and humidity levels for storage, installation and curing of materials.
- .5 Provide adequate ventilation to meet health regulations for safe working environment.

.4 Maintain temperatures of minimum 10 degrees Celsius in enclosed areas where construction is in progress.

.5 Ventilating:
- .1 Prevent accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.
- .2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.
- .3 Dispose of exhaust materials in manner that will not result in harmful exposure to persons.
- .4 Ventilate storage spaces containing hazardous or volatile materials.
- .5 Ventilate temporary sanitary facilities.
- .6 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.

.6 Maintain strict supervision of operation of temporary heating and ventilating equipment to:
- .1 Conform with applicable codes and standards.
- .2 Enforce safe practices.
- .3 Prevent abuse of services.
- .4 Prevent damage to finishes.
- .5 Vent direct-fired combustion units to outside.

.7 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.

.8 Provide heating adequate to meet temperature requirements listed in the following Sections:

- .1 For concrete work: to Section 03 33 00 - Cast-In-Place Concrete.

.2 For other sections where heating is required for cold-weather protection, heating requirements shall be in accordance with manufacturer's recommendations or applicable codes, regulations and standards.

1.9 TEMPORARY POWER AND LIGHT

.1 Arrange for connection with appropriate utility company. Pay costs for installation, maintenance and removal and on-going utilization cost.

.2 Provide and maintain temporary site lighting throughout project.
.1 Light to be placed as to minimize light pollution on traffic, residents and businesses.

1.10 TEMPORARY COMMUNICATION FACILITIES

.1 Provide and pay for temporary telephone and internet connections necessary for own use and use of Departmental Representative.

.2 Pay for long distance charges to a maximum of 1500 minutes per month. Invoice Departmental Representative for direct costs beyond this period with supporting documentation.

1.11 FIRE PROTECTION

.1 Provide and maintain temporary fire protection equipment during performance of Work required by governing codes, regulations and bylaws.

.2 Burning rubbish and construction waste materials is not permitted on site or at off-site laydown and storage areas.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Construction aids.

.2 Office and sheds.

.3 Parking.

.4 Project identification.

1.2 MEASUREMENT AND PAYMENT

.1 No separate measurement for payment shall be made for items under this section. Include cost in the contract Lump Sum Amount.

.2 Payments related to this Section shall be as set out in Section 01 22 01 – MEASUREMENT AND PAYMENT.

1.3 REFERENCES

.1 Canadian General Standards Board (CGSB)
  .1 CGSB 1.189-2000, Exterior Alkyd Primer for Wood.
  .2 CGSB 1.59-97, Alkyd Exterior Gloss Enamel.

.2 Canadian Standards Association (CSA International)
  .1 CSA A23.1:19/A23.2:19, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
  .2 CSA 0121-17, Douglas Fir Plywood.
  .3 CSA S269.2-16, Access Scaffolding for Construction Purposes.
  .4 CSA Z321-96 (R2006), Signs and Symbols for the Workplace.
  .5 CSA Z797-18, Code of practice for access scaffold.

.3 Ministry of Transportation (Ontario)
  .1 Environmental Guide for Erosion and Sediment Control During Construction of Highway Projects,2007
  .2 Greater Horseshoe Area Conservation Authorities, Erosion and Sediment Control Guideline for Urban Construction, 2006

.4 Public Services and Procurement Canada (PSPC) Standard Acquisition Clauses and Conditions (SACC)-ID: R0202D, Title: General Conditions 'C', In Effect as of: May 14, 2004.

.5 Occupational Health and Safety Act and Regulations for Construction Projects (R.S.O. 1990, c.0.1, current edition).

.6 U.S. Environmental Protection Agency (EPA) / Office of Water
.1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - SUBMITTAL PROCEDURES.

1.5 INSTALLATION AND REMOVAL

.1 Prepare and submit within 10 days of contract award, site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation including gate location.

.2 Identify areas that have to be gravelled to prevent tracking of mud.

.3 Indicate use of supplemental or other staging area off site as negotiated directly between contractor and land owner.

.4 Provide construction facilities in order to execute work expeditiously.

.5 Remove from site all such work after use.

1.6 SCAFFOLDING

.1 Scaffolding in accordance with CAN/CSA-Z797-09 (R2014).

.2 Provide and maintain ramps, swing staging, scaffolding, temporary stairs, ladders, platforms.

1.7 HOISTING

.1 Provide, operate and maintain hoists/cranes required for moving of workers, materials and equipment. Make financial arrangements with Subcontractors for their use of hoists.

.2 Hoists/cranes to be operated by qualified operator.

1.8 SITE STORAGE/LOADING

.1 Confine work and operations of employees defined by Contract Documents. Do not unreasonably encumber premises with products.

.2 Do not load or permit to load any part of Work with weight or force that will endanger Work.

1.9 CONSTRUCTION PARKING

.1 Establish construction site parking within the limits of the laydown area defined on the Drawings.

.2 Provide snow removal during period of Work.

.3 Construction site parking not allowed at lockstation parking. Contractor to arrange parking outside laydown areas independently with local authorities, land owners and businesses.

.1 Construction parking at lockstation parking outside of navigation season may be authorized with prior written approval of departmental representative.

.4 Vessels are not allowed to moor at the lock station walls and boat launch walls.

.5 Parking will be limited to areas confined by the limits of work. Do not block residential and commercial vehicular and pedestrian access to driveways and business. 3 parking spots will be reserved for Site resident, PSPC and consultant adjacent to their site office.

.6 If authorized to use existing roads for access to project site, maintain such roads for duration of Contract and make good damage resulting from Contractor’s use of roads.

1.10 SECURITY AND MONITORING

.1 Provide and pay for suitable security measures and methods to guard site and contents of site after working hours and during holidays. To be submitted to and approved by the Departmental Representative.

.2 Contractor shall pay for monitoring of the site during periods of no construction activity and to maintain and service dewatering and heating equipment, if required.

.3 Contractor shall be available for the operation of the diversion works as required to maintain seasonal

operating levels, including periods of no construction activity.

1.11 OFFICES

.1 Provide office heated to 22 degrees Celsius, lighted to 750 lx and ventilated, of sufficient size to accommodate site meetings and furnished with drawing laydown table. Provide lock and key for the office.

.2 Provide a clearly marked and fully stocked first-aid case in a readily available location.

.3 Subcontractors to provide their own offices as necessary. Direct location of these offices.

.4 Departmental Representative's site office.
- .1 Provide temporary office for Departmental Representative and Consultant, which shall be independent of the Contractor's office and secured.
- .2 Inside dimensions minimum 12 m long x 3 m wide x 2.4 m high, with floor 0.5m above grade, complete with four 50% opening windows and one lockable door, two offices in total plus a meeting room.
- .3 Insulate building and provide heating system to maintain 22 degrees Celsius inside temperature at -20 degrees Celsius outside temperature.
- .4 Finish inside walls and ceiling with plywood, hardboard or wallboard and paint in selected colours. Finish floor with 19 mm thick plywood.
- .5 Install electrical lighting system to provide min 750 lx using surface mounted, shielded commercial fixtures with 10% upward light component. Provide four electrical outlets.
- .6 Provide private washroom facilities adjacent to office complete with flush or chemical type toilet, lavatory and mirror and maintain supply of paper towels and toilet tissue.
- .7 Equip offices with 1 x 2 m table, 2 chairs, 3 m of shelving 300 mm wide, one three-drawer filing cabinet, one plan rack and one coat rack and shelf, adequate cooling and ventilation.
- .8 Equip meeting room with 1x3 m table, 8 chairs
- .9 Office to be of sound, lockable and weather-proof construction.
- .10 Provide high speed internet connection (WIFI or land)
- .11 Maintain in clean condition, including housekeeping at a minimum twice per week.
- .12 Pay all costs, including heating, utilities, lighting and installation and all cost necessary for continued use.

.13 Contractor responsible to maintain offices during periods of work stoppage or downtime.
.14 The office is to remain the property of the Contractor.

1.12 USE OF EXISTING HOUSE

.1 Contractor can use existing house and garage located on staging area as construction facilities.

.2 Contractor to apply all requirements for offices to the house.

.3 Contractor to maintain the house and assume all maintenance, repair, heating, cleaning, landscaping, utility and all costs associated with the building.

.4 Contractor to demolish the house and dispose of materials off site prior to site restauration.

.5 Treat designated wastes and hazardous material as per specifications 02 82 10, 02 82 00.01, 02 82 13.13 and 02 82 13,14 presented in the appendix.

1.13 EQUIPMENT, TOOL AND MATERIALS STORAGE

.1 Provide and maintain, in clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials.

.2 Locate materials not required to be stored in weatherproof sheds on site in manner to cause least interference with work activities.

1.14 SANITARY FACILITIES

.1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.

.2 Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition.

1.15 CONSTRUCTION SIGNAGE

.1 Provide and erect project sign, within three (3) weeks of signing Contract, in a location designated by Departmental Representative.

.1 Project signage in location directed by departmental representative.
.2 Footpath closure signs at site entrance and at south side of dam

.2 Construction sign 1.2 x 2.4 m, of wood frame and plywood construction painted with exhibit lettering produced by a professional sign painter.

.3 No other signs or advertisements, other than traffic, pedestrians and warning signs, are permitted on site.

.4 Provide project identification site sign comprising foundation, framing, and 1200 x 2400 one mm signboard as detailed and as described below.

.1 Foundations: 15 MPa concrete to CSA A23.1/A23.2 minimum 200 mm x 900 mm deep.
.2 Framework and battens: SPF, pressure treated minimum 89 x 89 mm.
.3 Signboard: 19 mm Medium Density Overlaid Douglas Fir Plywood to CSA O121.
.4 Paint: alkyd enamel to CGSB 1.59 over exterior alkyd primer to CGSB 1.189.
.5 Fasteners: hot-dip galvanized steel nails and carriage bolts.
.6 Vinyl sign face: printed project identification, self-adhesive, vinyl film overlay, supplied by Departmental Representative.

.5 Locate project identification sign as directed by Departmental Representative and construct as follows:

.1 Build concrete foundation, erect framework, and attach signboard to framing.
.2 Paint surfaces of signboard and framing with one coat primer and two coats enamel. Colour white on signboard face, black on other surfaces
.3 Apply vinyl sign face overlay to painted signboard face in accordance with installation instruction supplied.

.6 Indicate on sign, name of Owner, Consultant, Contractor and Subcontractor with logo, Name of Project, Project Identification Reference of design style established by Departmental Representative

.7 Direct requests for approval to erect Consultant/Contractor signboard to Departmental Representative. For consideration general appearance of Consultant/Contractor signboard must conform to project identification site sign. Wording in both official languages.

.8 Signs and notices for safety and instruction in both official languages Graphic symbols to CSA Z321.

.9 Maintain approved signs and notices in good condition for duration of project, and dispose of off-site on

completion of project or earlier if directed by Departmental Representative.

1.16 PROTECTION AND MAINTENANCE OF TRAFFIC

.1 Provide access and temporary relocated roads as necessary to maintain traffic. Refer to Section 01 55 26 - TRAFFIC CONTROL.

.2 Provide and erect, within four weeks prior any road closure, two road closure notice signs in a location designated by Departmental Representative.

.3 Maintain and protect traffic on affected roads during construction period except as otherwise specifically directed by Departmental Representative.

.4 Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs.

.5 Protect travelling public from damage to person and property.

.6 Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.

.7 Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by construction operations.

.8 Construct access and haul roads as necessary.

.9 Haul roads: constructed with suitable grades and widths; sharp curves, blind corners, and dangerous cross traffic shall be avoided.

.10 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.

.11 Dust control: adequate to ensure safe operation at all times.

.12 Lighting: to ensure full and clear visibility for full width of haul road and work areas during night work operations.

.13 Provide snow removal during period of Work. Refer to Section 01 74 11 - CLEANING.

.14 Remove, upon completion of work, haul roads designated by Departmental Representative.

1.17 CLEAN-UP

.1 Clean as per section 01 74 11 - CLEANING.

.2 Remove construction debris, waste materials, packaging material from work site daily.

.3 Clean dirt or mud tracked onto paved or surfaced roadways.

.4 Store salvageable materials resulting from demolition activities.

.5 Stack stored new or salvaged material.

.6 Maintain area (mowing grass, maintain buildings) from contract award to site hand-off.

PART 2 - PRODUCT

2.1 NOT USED

.1 Not used

PART 3 - EXECUTION

3.1 TEMPORARY EROSION AND SEDIMENT CONTROL PLAN

.1 Prepare, implement, monitor and maintain an Erosion and Sediment Control Plan (ESCP) to provide water quality protection. The ESCP is to mitigate the potential for soil erosion and discharge of soil-bearing runoff or airborne dust resulting from the Contractor's construction operations from entering all watercourses including drainage ditches, environmental sensitive areas, adjacent properties to the Working Area, and from the Contractor's camp. The ESCP is also to address turbidity control to prevent sediment migration from the Working Area while in-water work is being performed, and from temporary diversion works.

.2 Carry out construction operations that may impact upon water quality in a manner that strictly meets the requirements of all applicable legislation and regulations.

.3 Determine and conform to the requirements of the Department of Fisheries and Oceans Canada(DFO), the Ontario Ministry of the Environment, Conservation and Parks (MECP), the local municipality and/or Township, the area Conservation Authority, and any other Governmental Regulatory Agencies having jurisdiction in the Working Area or over any potentially impacted watercourses.

.1 It shall be the responsibility of the Contractor to obtain written approvals from DFO, MECP and the area Conservation Authority for the Contractor's proposed water quality protection schemes.

.4 Before commencing work, provide four (4) copies of a detailed Erosion and Sediment Control Plan for the Contractor's proposed water quality protection schemes bearing the seal and signature of a qualified Professional Engineer licensed to practice in the Province of Ontario. The ESCP will contain but is not limited to the following:

.1 Description of site condition, potential erosion and sediment issues at the site and associated risk;

.2 Description and details of environmental controls to be put in place;

.3 Phasing steps and coordination of environmental control measures installation with sequence of construction;

.4 Inspection, monitoring and maintenance program of all control measures during construction, work stoppage and post- construction, including additional inspections following large storm events and other periods of runoff;

.5 Monitoring plan of water quality at outlet of any construction site discharge at a receiving watercourse, and within the watercourse where in-water activities are taking place, to the requirements of Section 01 48 00;

.6 Control measures and procedure to be employed during commissioning and operations of the diversion system, and commissioning and initial operation of the new dam;

.7 Emergency contingency plan (provision of additional labour, equipment and materials to install additional control measures, and detail an emergency response plan in case of an accidental event);

.8 Procedures and phasing of the removal and disposal of the control measures;

.9 Removal of all sediment and other materials contained by the temporary works.

.5 The designer of the ESCP is to visit the site prior, during and after construction to plan and evaluate the requirements for control measures, their installation and their effectiveness. The designer is to conduct a thorough inspection, as part of their site assessment, and provide a risk assessment and mitigation plan to the Contractor and the Departmental Representative. The ESCP shall be revised as required as a result of their site assessment and monitoring.

.6 In the event of a work stoppage due to weather, seasonal work stoppage, contractual disputes or direction by a Regulatory agency, the Contractor is to continue monitoring and maintaining the erosion and sediment control measures.

.7 Guidelines for the development of an ESCP can be found in the 2007 Ministry of Transportation (Ontario), Environmental Guide for Erosion and Sediment Control During Construction of Highway Projects, and the 2006 Greater Horseshoe Area Conservation Authorities, Erosion and Sediment Control Guideline for Urban Construction.

.8 Measures may include but shall not be limited to the following: sediment ponds, silt fences/ barriers, straw bales, geotextiles, check dams and/or berms, biodegradable filter socks, erosion mats, vegetation, interceptor ditch/swales, mechanical equipment, or other recognized technologies and methods available at the time of construction.

.9 Contractor shall supply and install additional or alternative measures as directed by the Engineer or Project Supervisor if the installed control measures fail to perform adequately.

.10 Monitor weather forecasts and schedule the Work in order to minimize the risk of sediment-laden runoff entering any watercourse and other environmentally sensitive areas.

.11 The ESCP shall provide a contingency plan to include the provision of additional labour, equipment or materials to install additional control measures, and detail an emergency response plan in case of an accidental event.

.12 Ensure all workers, including sub-contractors, in the working areas are aware of the importance of the erosion and sediment control measures and informed of the consequences of the failure to comply with the requirements of the Regulatory Agencies and these specifications.

.13 Clean out accumulated sediment deposits periodically as required at the sediment control devices, including those deposits that may originate from outside the construction area. Accumulated sediment shall be removed in such a manner that prevents the deposition of this material into any sewer or watercourse and avoids damage to the control measure. The sediment shall be removed from the site at the Contractor's expense and managed in compliance with the requirements for excess earth material, as specified elsewhere in the Contract.

.14 Immediately report to the Departmental Representative any accidental discharges of sediments material into either the watercourse or adjacent ditches. Appropriate response measures, including any repairs to existing control measures or the implementation of additional control measures, shall be carried out by the Contractor without delay.

.15 Remove the sediment control measures when, in the opinion of the Departmental Representative, the measure(s) is no longer required. All sediment and erosion control measures shall be removed in a manner that avoids the entry of any equipment, other than hand-held equipment, into any watercourse, and prevents the release of any sediment or debris into any sewer or watercourse within or downstream of the Working Areas.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 02 41 16 - Structure Demolition

.2 Section 32 01 90.33 - Tree and Shrub Preservation

.3 Section 35 20 22 - Dewatering and Diversion

1.2 REFERENCES STANDARDS

.1 Province of Ontario.
  .1 Occupational Health and Safety Act and Regulations for Construction Projects, R.S.O. 1990 as amended, O. Reg. 213/91 as amended.
  .2 Air pollution - Local Air Quality (O. Reg. 419/05).
  .3 Ontario Ministry of Transportation, Ontario Traffic Manual, Book 7 - Temporary Conditions - 2014 (OTM - Book 7).

.2 Canadian Standards Association (CSA International).
  .1 CSA S269.2-16, Access Scaffolding for Construction Purposes.
  .2 CSA O121-17, Douglas Fir Plywood.

1.3 MEASUREMENTS AND PAYMENT PROCEDURES

.1 There shall be no separate measurement for payment for the work under this Section. Include cost in the contract Lump Sum Amount.

.2 Payment of this Section shall be as set out in Section 01 22 01 – Measurement and Payment.

1.4 INSTALLATION AND REMOVAL

.1 Provide temporary controls in order to execute Work expeditiously.

.2 Remove from site all such work after use.

1.5 WORK AREA DELINEATION

.1 Erect and maintain temporary site enclosures and barriers to delineate the work area as identified on the drawings and other measures as necessary to define

the Work area and restrict access of the public to the Work area.

.2 Place construction warning signage at the work area and construction camp.

.3 Provide lockable truck entrance gate(s) as approved and conforming to applicable traffic restrictions on adjacent roads. Equip gates with locks and keys.

.4 Provide and maintain temporary floating barriers to define the Work area in the waterway and to restrict access to boating public to dewatering and diversion Works, as indicated on the drawings and as set in Section 35 42 15 - Safety Boom.

1.6 CONSTRUCTION AND DETOUR SIGNAGE

.1 Provide a construction Traffic Control Plan for both work related and local vehicular traffic as set out in Section 01 35 00.06 – Special Procedures for Traffic Control.
  .1 Provide barricades to direct traffic to alternate routes as provided in the construction Traffic Control Plan.

.2 Provide a pre-construction record of the approved haul route annotated as to location, and any road deficiencies as set out in Section 01 20 01 – SITE ACCESS.

.3 Identify measures to upgrade haul road for construction traffic to governing authorities, Agency, and Departmental Representative.
  .1 Upon confirmation, implement haul road upgrades to the requirements of the Municipalities and the Departmental Representative.

.4 Provide Notice and Detour Signage in both official languages and by graphic symbols as identified in the construction Traffic Control Plan.

1.7 GUARD RAILS AND BARRICADES

.1 Provide secure, rigid guard rails and barricades around deep excavations open stair wells, open edges of slabs and decks, and any other location where there exists a falling hazard greater that 2 m.

.2 Provide as required by governing authorities.

1.8 NAVIGATION WARNING SIGNAGE

.1 The traffic plan mentioned above shall also address boating traffic.

.2 Provide and maintain navigation warning signage and markers regarding construction and temporary Works as identified on the drawings and set out in Section 10 14 55 – Safety Signage.

1.9 TREE PROTECTION

.1 Provide and maintain access roads, sidewalk crossings, ramps and construction runways as may be required for access to work areas, and for public and Parks Canada staff access to the waterway and related structures and buildings.

.2 Undertake approved measures to upgrade haul road for construction traffic.

1.10 PUBLIC TRAFFIC FLOW

.1 Maintain access to property including overhead clearances for use by emergency response vehicles.

1.11 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

.1 Protect surrounding private and public property from damage during performance of Work.

.2 Be responsible for damage incurred.

1.12 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse in accordance with Section 01 74 21 – Construction / Demolition Waste Management and Disposal.

PART 2 - ENCLOSURES

2.1 Description

.1 This Section specifies requirements for designing, supplying, installing, inspecting, maintaining and removing:
  .1 Cold weather protection, consisting of temporary housing and supplementary heating for the workspaces and the work, as described in these Specifications. At a minimum, the requirements of this Section apply to all Sections of

Specifications that call for cold weather protection. Cold weather protection provisions specified in other Sections also apply and take precedence over this Section in case of contradiction or discrepancy.

.2 Housing and containment systems.

.3 Lighting and ventilating workspaces.

.2 Work not included in this Section:

.1 Provision of separate air supply for workers, which is part of the Contractor's responsibility under Health and Safety regulations for construction.

.3 Intent: housing, heating and ventilating must be sufficient to:

.1 Ensure safe working environment.

.2 Facilitate progress of work in an efficient manner during extreme temperatures or weather condition.

.3 Protect areas adjacent to work during procedures which may cause damage to surrounding areas.

.4 Protect work and products against dampness and cold.

.5 Provide adequate ambient temperatures and humidity levels for storage, placement, installation and curing of materials.

2.2 SUBMITTALS

.1 Where cold weather work is applicable, submit shop drawings showing:

.1 Type and construction of housing and enclosures, connections with scaffolding, stability system, Sheathing and method of sealing.

.2 Ventilation fan location and capacity.

.3 Heater numbers, types, locations and capacities. Size of drip trays provided with all liquid-fueled heaters.

.4 Temperature monitoring equipment.

.5 Number and location of fire extinguishers associated with heating equipment.

.6 Number, type, strength of all lighting provided with enclosure.

.2 Provide shop drawings and set up methodology for all scaffolding, including locations and heating measures, during concrete placement. Refer to Section 03 30 00 - CAST-IN-PLACE CONCRETE.

2.3 GENERAL WEATHER CONDITIONS

.1 The Contractor is expected to be prepared to deal with sub-zero temperatures, snow fall and strong winds with

gusts, heat wave, rain and any other weather conditions.

2.4 INSTALLATION AND REMOVAL

.1 Provide temporary controls in order to execute Work expeditiously.

.2 Remove from site all such work after use.

2.5 SCAFFOLDING, HOARDING AND BARRIERS

.1 Provide all scaffolding, ladders, access, lifting equipment, etc., as necessary, to carry out the work of all trades and as per the requirements of the work.

.2 Scaffolding shall be erected on wood sills.

.3 Provide suitable ladders to scaffolding at each section of scaffold isolated from other sections, for full height of scaffold. Access from the ladder(s) to the scaffolding shall be clear of obstructions and cross bracing so workers and materials can easily enter.

.4 Scaffolding shall be designed, drawn and inspected by a registered Professional Engineer experienced in this work. Provide shop drawings for review. All shop drawings shall be stamped and signed by a Professional Engineer licensed in the Province of Ontario. Prior to using the scaffolding for carrying out the work, the designing Professional Engineer of the scaffolding shall complete an inspection of the installation and shall provide the Departmental Representative with a letter stating that the installation conforms with the design and is suitable for use by the Contractor.

.5 Make any and all changes to scaffolding that may be required by Ministry of Labour officials.

.6 Make periodic inspections of scaffolding as work progresses.

.7 Install and maintain all barriers around the site to prevent access by the public to the immediate work areas. Barriers shall be able to provide a physical and visual barrier to navigational and pedestrian traffic. All barriers shall be in accordance with the Occupational Health and Safety Act.

.8 Provide hoarding and other measures, as indicated by the Departmental Representative, to protect the public.

.9 Remove all barriers accordingly at the completion of the work and/or as directed by the Departmental Representative.

.10 Provide barriers around trees and plants designated to remain. Protect from damage by equipment and construction procedures.

2.6 DUST TIGHT SCREENS

.1 Provide dust tight screens or partitions to localize dust generating activities, and for protection of workers, finished areas of Work and public.

.2 Maintain and relocate protection until such work is complete.

2.7 HOUSING AND CONTRAINMENT

.1 Provide strong and durable enclosures and containment for portions of Work to be protected, heated and/or ventilated during Work.
- .1 Enclosure to be strong enough to withstand rain, wind and snow loads.
- .2 Enclosure to be insulated against cold.
- .3 Electrical wiring, lights, and other equipment located inside enclosure: explosion-proof type. Illumination shall be sufficient for safe execution of the work.
- .4 Access scaffolding design criteria shall include all forces generated by enclosures supported off the scaffold. This shall be clearly shown on shop drawings for access scaffolding.
- .5 Enclosures independent from access scaffolding shall be designed, drawn and inspected by a registered Professional Engineer experienced in this work. Provide shop drawings for review. All shop drawings shall be stamped and signed by a Professional Engineer licensed in the Province of Ontario.

2.8 HEATING

.1 Provide temporary heating required during construction period, including watch keeping attendance, maintenance and fuel.

.2 Temporary heating system shall have a backup system and fuel storage capacity adequate for 48 hours of continuous operation.

.3 Be responsible for damage to work due to failure in providing adequate heat and protection during construction.

.4 Fire protection requirements: refer to Section 01 11 00 - GENERAL INSTRUCTIONS.

.5 Use only heating equipment types accepted by the Departmental Representative.

.6 Heating fuels: indirect fired heaters.

.7 Fuel storage: to requirements of Fire Commissioner of Canada and Section 01 35 43 - ARCHEOLOGICAL, CULTURAL AND ENVIRONMENTAL PROCEDURES.

.8 Provide and maintain temporary fire protection equipment during performance of work commensurate with fuel source selected.

.9 Ensure that heating requirements are met by providing, at optimum efficiency of equipment, a capacity of 125% of heat requirement and a sufficient number of standby heaters ready for use at the site.

.10 Vent exhausts of heating equipment outside of housing, well clear of combustible materials and fresh air intake.

2.9 VENTILATING EQUIPMENT

.1 Intent of ventilation:
- .1 To ensure required air temperature and quality in all parts of enclosure.
- .2 To enhance Health and Safety of workers.

.2 Depending upon configuration of enclosure, it may be necessary to install both a mechanical supply and exhaust ventilation system to effect adequate air changes within confined space. Locate air-moving devices in a manner that ensures that airflow is not restricted or short circuited and is supplied in proper direction and does not interfere with work.

.3 Ventilate storage spaces containing hazardous or volatile materials.

2.10 FIELD QUALITY CONTROL AND WATCH KEEPING

.1 Provide and post at approved locations within enclosure, one maximum/minimum thermometer per approximately forty (4) square meters of plan area of enclosure.

.2 Record maximum and minimum temperature at each thermometer on a daily basis, and re-setting of thermometers as necessary.

.1 Make temperature records available to the Departmental Representative on a daily basis.
.2 Provide certified written records to the Departmental Representative on a weekly basis.

.3 Ensure continuity of protection by providing a watch keeper to make periodic checks at all times when work is not in progress.

.4 Watch keeper's qualifications, under this section of specifications, are to be sufficient to perform such duties as:
.1 Maintain strict supervision of operation of temporary heating and ventilating equipment.
.2 Enforce safe practices.
.3 Prevent abuse of services.
.4 Prevent damage to finishes due to misuse of heating and ventilating equipment.
.5 Undertake preventative maintenance and re-fueling.
.6 Complete emergency repairs of minor complexity.
.7 Place standby items in service.

PART 3 - PRODUCTS

3.1 MATERIALS

.1 Subject to approval by the Departmental Representative as to type, materials and detail. Use:
.1 New materials;
.2 Salvaged/recycled materials in good condition, or;
.3 Prefabricated portable components in a good, safe condition.

PART 4 - EXECUTION

4.1 NOT USED

.1 Not Used

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Product quality, availability, storage, handling, protection, and transportation.

.2 Manufacturer's instructions.

.3 Quality of Work, coordination and fastenings.

.4 Existing utilities.

1.2 REFERENCES STANDARDS

.1 Within text of each specifications section, reference may be made to reference standards. Conform to these reference standards, in whole or in part as specifically requested in specifications.

.2 If there is question as to whether products or systems are in conformance with applicable standards, the Departmental Representative reserves right to have such products or systems tested to prove or disprove conformance.

.3 Cost for such testing will be borne by Departmental Representative in event of conformance with Contract Documents or by Contractor in event of non-conformance. Delays for such testing will be attributed to Departmental Representative in event of conformance with Contract Documents or to Contractor in event of non-conformance.

.4 Conform to latest date of issue of referenced standards in effect on date of submission of Bids, except where specific date or issue is specifically noted.

1.3 OPSS ONTARIO PROVINCIAL STANDARD

.1 Whenever OPSS Ontario Provincial Standard Specifications and OPSD Ontario Provincial Standard Drawings are been quoted in these specifications, any standards, specifications or publications which are referred to within the specified OPSS or OPSD form an integral part of those documents and thus form an integral part of these specifications, unless specifically otherwise mentioned.

1.4 QUALITY ASSURANCE

.1 Products, materials, equipment and articles incorporated in Work shall be new, not damaged or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.

.2 Salvage materials as identified for reuse shall be safely and securely stored.

.3 Procurement policy is to acquire, in cost effective manner, items containing highest percentage of recycled and recovered materials practicable consistent with maintaining satisfactory levels of competition. Make reasonable efforts to use recycled and recovered materials and in otherwise utilizing recycled and recovered materials in execution of work.

.4 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.

.5 Should disputes arise as to quality or fitness of products, decision rests strictly with Departmental Representative based upon requirements of Contract Documents.

.6 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout the project.

.7 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located on mechanical equipment.

.8 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Departmental Representative if required Work is such as to make it impractical to produce required results.

.9 Quality control shall be provided by the contractor as part of his ITP and QMP as set out in Section 01 45 00 – QUALITY ASSURANCE AND QUALITY CONTROL.

1.5 AVAILABILITY

.1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, notify Departmental Representative of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.

.2 In event of failure to notify Departmental Representative at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Departmental Representative reserves right to substitute more readily available products of similar character, at no increase in Contract Amount or Contract Time.

1.6 STORAGE, HANDLING AND PROTECTION

.1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.

.2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.

.3 Store products subject to damage from weather in weatherproof enclosures.

.4 Store cementitious products clear of earth or concrete floors, and away from walls.

.5 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.

.6 Store sheet materials, lumber, structural steel and steel reinforcement on flat, solid supports and keep clear of ground. Slope to shed moisture.

.7 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.

.8 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.

.9 Touch-up damaged factory finished surfaces to Departmental Representative's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

1.7 TRANSPORTATION

.1 Pay costs of transportation of products required in performance of Work.

.2 Pay costs of transporting of specified material and equipment to be salvaged and re-used to and from the facility designated by Departmental Representative within 100 km. Work includes, dismantling, loading and unloading, handling, reassembling and storing such products.

1.8 MANUFACTURER'S INSTRUCTIONS

.1 Unless otherwise indicated in specifications, install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.

.2 Notify Departmental Representative, in writing, of conflicts between specifications and manufacturer's instructions, so that Departmental Representative will establish course of action.

.3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Departmental Representative to require removal and re-installation at no increase in Contract Amount or Contract Time.

1.9 QUALITY OF WORK

.1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Departmental Representative if required Work is such as to make it impractical to produce required results.

.2 Do not employ anyone unskilled in their required duties. Departmental Representative reserves right to require dismissal from site, workers deemed incompetent or careless.

.3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Departmental Representative, whose decision is final.

1.10 COORDINATION

.1 Ensure co-operation of workers in laying out Work. Maintain efficient and continuous supervision.

.2 Be responsible for coordination and placement of openings, sleeves, parts embedded in concrete and other accessories.

1.11 CONCEALMENT

.1 In finished areas, conceal pipes, wiring, etc. in slabs, walls and footings, except where indicated otherwise.

.2 Before installation inform Departmental Representative if there is interference. Install as directed by Departmental Representative.

1.12 REMEDIAL WORK

.1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Co-ordinate adjacent affected Work as required.

.2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

1.13 FASTENINGS - EQUIPMENT

.1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.

.2 Use heavy hexagon heads, semi-finished unless otherwise specified.

.3 Bolts may not project more than one diameter beyond nuts.

.4 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.

.5 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

1.14 PROTECTION OF WORK IN PROGRESS

.1 Prevent overloading of structures. Do not cut, drill or sleeve load bearing structural member, unless specifically indicated, without written approval of Departmental Representative.

1.15 EXISTING UTILITIES

.1 When breaking into or connecting to existing services or utilities, execute Work at times directed by local governing authorities, with minimum of disturbance to Work, and pedestrian and vehicular traffic.

.2 Protect, relocate or maintain existing active services. When services are encountered, cap off in manner approved by authority having jurisdiction. Stake and record location of capped service.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used

PART 3 - EXECUTION

3.1 NOT USED

.1 Not used

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Field engineering survey services to measure and stake site.

.2 Recording of subsurface conditions found.

.3 List of geotechnical reports, and environmental studies undertaken for the project and available to the contractor.

.4 Description of existing site

1.2 REFERENCES

.1 Owner's identification of existing survey control points and property limits.

1.3 MEASUREMENT AND PAYMENT

.1 No separate measurement for payment shall be made for items under this section. Include cost in the contract Lump Sum Amount.

.2 Payments related to this Section shall be as set out in Section 01 22 01 – Measurement and Payment.

1.4 QUALIFICATIONS OF SURVEYOR

.1 Qualified and experienced surveyor, acceptable to Departmental Representative is to carry out preconstruction survey, the layout work and setting elevations and surveys for quantity measurement.

.2 Qualified registered land surveyor with Ontario Land Surveyor (OLS) and Canadian Land Surveyor (CLS) designations, licensed to practice in the province of Ontario, and/or qualified surveyor to establish control and permanent benchmarks including registering permanent benchmark on COSINE.

.3 Qualified and experienced surveyor with Ontario Land Surveyor (OLS) and Canadian Land Surveyor (CLS) designations, acceptable to Departmental Representative is to carry out verification of the layout and elevation of dam as well as benchmarks and control points. OLS/CLS is also to conduct final survey of the work.

1.5 SURVEY CONTROL POINTS

.1 Establish base horizontal and vertical control points using two loops from two separate first order benchmarks registered on COSINE and established on structure not susceptible to movement (frost heave or impacts from construction)
  .1 Submit control point location map, vertical and horizontal coordinate for verification by Departmental representative within 40 working days of Contract Award. No permanent work will be authorized until benchmarks are verified by third party. Allow 40 working days for validation by departmental representative.

.2 Report to Departmental Representative when a control point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.

.3 Surveyor to establish two control point on each shore (total of 4)

1.6 PERMANENT BENCHMARK

.1 Install permanent benchmark on top of north gravity dam. Location to be confirmed with departmental representative prior to installation

.2 Register benchmark on COSINE

1.7 SURVEY REQUIREMENTS

.1 All survey in NAD 83 “zone 17” for horizontal datum, GSC:1928-1978 vertical Datum
  .1 Do not use 2013 vertical Datum

.2 Qualified land surveyor is to prepare as found record of the structure and ancillary works including confirmation of all elevations (in 1978 GSC datum), dimensions, and alignments indicated on the contract drawings. This must be provided in AutoCAD format. Any deviations between as found conditions and contract drawings must be brought to the attention of the Departmental Representative upon discovery.

.3 Establish reference lines and levels as shown on contract drawings, locate and lay out, by instrumentation.

.4 Establish reference line, perpendicular to flow, in alignment with the upstream face of the dam as shown on the contract drawings.
  .1 Provide northing, easting and elevation of the reference points for the upstream reference line

as shown on the contract drawings to the Departmental Representative.

.5 Establish reference line, parallel to flow, in alignment with the centerline of the center pier as shown on the contract drawings.

.1 The center point between the center pier steel gain liners must be identified on the top of the pier and provided northing, easting and elevation to Departmental Representative.

.2 Reference line must be established by projecting a line through the center point between the gains, perpendicular to the upstream face reference line.

.3 Provide northing, easting and elevation of the reference points for the pier center reference line as shown on the contract drawings to the Departmental Representative.

.6 Stake for grading, fill and topsoil placement and landscaping features. Stake slopes and berms.

.7 Establish foundation and stake batter boards for foundations.

.8 Establish lines and levels for sluiceway, sluiceway sill, spillway, spillway sill, gravity dams, walls, etc.

1.8 EXISTING SERVICES

.1 Before commencing work, establish location and extent of service lines in area of Work and notify Departmental Representative of findings.

.2 Protect any line encountered during excavation work. Remove abandoned service lines within 2 m of structures. Cap or otherwise seal lines at cut-off points as directed by Departmental Representative.

1.9 RECORDS

.1 Qualified land surveyor is to prepare as built record of the structure and ancillary works including confirmation of all elevations, dimensions, and alignments indicated on the contract drawings. This must be provided in AutoCAD format.

.2 Maintain a complete, accurate log of control and survey work as it progresses.

.3 On completion of foundations including foundation of temporary work, and demolished structures and major site Works and improvements, prepare a certified survey showing dimensions, locations, angles and

elevations of Work as part of As-Built record documentation.

.4 Record locations of maintained, re-routed and abandoned service lines.

.5 Submit paper and electronic copies of record drawings per Section 01 78 00 – Closeout Submittals.

1.10 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit name and address of Surveyor to Departmental Representative 5 days prior to survey.

.2 On request of Departmental Representative, submit documentation to verify accuracy of field engineering work including survey records within 2 days.

1.11 DAM AND LOCK 28 EXISTING CONDITION

.1 Various report attached to the tender package
- .1 Dam safety review
- .2 Geotechnical investigations
- .3 Underwater survey
- .4 Designated substance report

.2 Lock 28 is located outside of project area

.3 Lock 28 upstream walls are located next to the boat launch

.4 The contract drawings show the shape of the Lock as taken from available drawings. The Lock was not surveyed and the condition of the structure has not been evaluated.

1.12 SITE EXISTING CONDITION VIDEO SURVEY

.1 Take video survey of the site and provide to departmental representative prior to commencement of work. The survey must cover at a minimum:
- .1 Lock 28 and service buildings
- .2 Lock upstream walls
- .3 Lock parking lot and surrounding landscaped areas
- .4 Boat launch
- .5 Existing utilities
- .6 Existing dam
- .7 North staging area
- .8 Highway 28 extending 100 m north and south of MTO bridge downstream of dam

.9 Burleigh falls in and associated restaurant and businesses as per owner agreement or at minimium of parking area next to HWY 28.
.10 Lovesick campground cabins upstream of existing dam
.11 Lovesick lake Campground as per agreement with owner or at a minimum an area extending 10 m around all work area and accesses (demolition of existing dam, seepage control, dewatered area, vegetation clearing, construction of new dam access, etc…)
.12 Provide survey within 20 days of contract award.

.2 Identify any major defect or deterioration to the attention of departmental representative to serve as a baseline for restauration works.

.3 Complete a video survey covering the same extent as the commencement of work survey upon completion of the work prior to site hand over. Submit survey within 5 days of completion.

1.13 EXISTING DECK VISUAL INSPECTION

.1 Perform a visual inspection of the existing dam deck. The objective of this report shall be to evaluate the condition of the structure and validate the rated capacity provided on the Drawings.

.2 Following the visual inspection and at least four (4) weeks prior to beginning the Work, submit to the Departmental Representative a photographic report signed by a Professional Engineer licensed to practice in Ontario detailing the results of the visual inspection.

.3 The photographic report shall include, at a minimum, the following:
.1 Inspection methodology.
.2 Photographs of the top and lower surface of the deck for each sluice.
.3 Detailed description and photographs of all the observed deficiencies for each sluice. Deficiencies to be included in the report shall include, without being limited to: surface defects in concrete of depth greater than 40 mm, cracks in concrete of width greater than 1 mm and any exposed reinforcing bars and condition of such reinforcement.

1.14 SUBSURFACE CONDITIONS

.1 Copies of geotechnical investigations are available as part of tender package.

.2 In the event of disagreement between the plans and specification and recommendations made in the reports, the plans and specification will govern.

.3 Reference information is for general information and is not guaranteed. The Contractor is responsible for ensuring the information is sufficient for the purposes of this Contract and for supplementing this information if necessary.

.4 Interpretation of the reference information is strictly the Contractor's responsibility. The number of boreholes required to determine the localized underground conditions between boreholes affecting construction costs, techniques, sequencing, equipment, scheduling, etc., could be greater than has been carried out for design purposes. Contractors bidding on or undertaking the works should, in this light, decide on their own investigations, as well as their own interpretations of the factual borehole results, so that they may draw their own conclusions as to how the subsurface conditions may affect them.

.5 IDENTIFICATION OF REPORTS
- .1 Dam safety review
- .2 Geotechnical investigations
- .3 Underwater survey
- .4 Designated substance report

1.15 RECORD OF SUBSURFACE CONDITIONS

.1 Conduct survey at the following incidences:
- .1 Prior to excavation (after dewatering for in-water areas)
- .2 Prior to rock excavation
- .3 After rock excavation and dental treatment

.2 The survey can be conducted in parts as to facilitate staging.

.3 Conduct survey under supervision of departmental representative.

.4 Provide survey in electronic format, including 3D surface, to departmental representative prior to continuing next stage of work.

PART 2 - PRODUCTS

.1 Not used

PART 3 - EXECUTION

.1 Not used

END OF SECTION

PART 1 - GENERAL

1.1 DESCRIPTION

.1 This Section specifies requirements for cleaning during the project, including:
  .1 Progressive cleaning;
  .2 Final cleaning;
  .3 Snow removal.

1.2 MEASUREMENT AND PAYMENT

.1 No separate measurement for payment shall be made for items under this section. Include cost in the contract Lump Sum Amount.

.2 Payments related to this Section shall be as set out in Section 01 22 01 – Measurement and Payment.

1.3 REFERENCES

.1 Construction to be in accordance with the latest edition of the applicable Ontario and National codes. The above to govern except where other applicable codes or provided notes are more restrictive.

.2 United States Environmental Protection Agency (USEPA)
  .1 EPA 833-F-11-006 - Stormwater Best Management Practices: Concrete Washout, 2012

1.4 INFORMATION AND SUBMITTALS

.1 Submit to the Department representative the Snow Removal Plan, including de-icing materials data sheets and snow removal, de-icing materials placement procedures for review of concerns related to Health and Safety and Environmental Protection.

1.5 PROGRESSIVE CLEANING

.1 Maintain Work in tidy condition, free from accumulation of waste products and debris.

.2 Remove waste and excess materials from site at daily regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site.

.3 Store tool and equipment after use.

.4 Clear snow and ice from project site and staging areas. Temporary bank/pile snow within work limits and/or remove from site as required.

.5 Do not allow work to be buried in snow.

.6 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris. Provide on-site containers for collection of waste materials and debris.

.7 Provide and use marked separate bins for recycling. Refer to Section 01 74 21- CONSTRUCTION/DEMOLITION WASTE MANAGEMENT AND DISPOSAL. Dispose of waste materials and debris from site and deposit into waste containers at end of each working day.

.8 Store volatile waste in covered metal containers, and remove from premises at end of each working day.

.9 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.

.10 Use only materials and equipment which will not damage the finished product

.11 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

.12 Clean and maintenance of haul routes on a weekly basis, or in accordance with the authorities having jurisdictions, whichever is more stringent.

.13 Keep public roadway clean and routinely remove sediment and debris from roadway caused by construction activities.

.14 Collect, retain and dispose all the concrete washout water (or washwater)and solids in leak proof containers in accordance with:
- .1 EPA 833-F-11-006 - Stormwater Best Management Practices: Concrete Washout; and
- .2 Section 01 74 21 CONSTRUCTION/DEMOLITION WASTE MANAGEMENT AND DISPOSAL;

.15 Do not allow waste to fall into or blow into watercourse. Place light waste that may blow away, immediately into closed containers.

.16 Separate and process construction and demolition waste in accordance with Section 01 74 21 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

1.6 FINAL CLEANING

.1 When Work is Substantially Performed remove surplus products, tools, surplus stockpiled material, construction machinery and equipment not required for performance of remaining Work from project site and staging area.

.2 Remove waste products and debris, and leave Work clean and suitable for occupancy.

.3 Prior to final review, remove surplus products, tools, construction machinery and equipment.

.4 Remove waste materials and debris from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site.

.5 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of surplus stockpiles material, waste and debris.

.6 Remove stains, spots, marks and dirt from railing, signs, safety booms, and dam equipment.

.7 Inspect finishes and equipment and ensure specified workmanship and operation.

.8 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.

.9 Remove dirt and other disfiguration from exterior surfaces.

.10 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.

.11 Remove snow and ice from access to building.

.12 Sweep and wash clean paved areas.

.13 Clean drainage systems.

.14 The area inside of the downstream coffer dams will be cleaned prior to commissioning, in order to mitigate turbidity from the former construction area as it is watered up.

.15 Upon completion, remove scaffolding, temporary protection and surplus materials. Make good any defects noted at this stage.

.16 Clean areas under contract to a condition at least equal to that previously existing and to approval of the Departmental Representative.

1.7 SNOW REMOVAL

.1 Remove snow and ice from within construction zone and staging area to allow execution of work.

.2 Remove snow and ice from: work areas, storage areas, parking areas, construction access roads, access systems, scaffolding, hoarding, etc.

.3 Do not allow snow to fall into or dump snow directly to water body.

.4 Do not stockpile cleared snow on site, but rather dispose of it progressively away from site at a location approved by the Departmental Representative.

.5 Do not use salt as a de-icer or sand for traction.
- .1 Where ice is a safety concern, use environmentally acceptable de-icing or traction materials approved by PCA.
- .2 No de-icer or traction materials shall be allowed to enter the waterway.
- .3 Follow Manufacturer's instructions for application of de-icing products.

.6 Keep work areas and access to work areas, including excavation bottoms, scaffolding, walkways, stairs, ladders, construction access paths and parking areas free of snow and ice for the duration of work.

1.8 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for recycling and reuse in accordance with Section 01 74 21- CONSTRUCTION/DEMOLITION WASTE MANAGEMENT AND DISPOSAL.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used

PART 3 - EXECUTION

3.1 NOT USED

.1 Not used

END OF SECTION

PART 1 - GENERAL

1.1 WASTE MANAGEMENT GOALS

.1 Prior to start of Work conduct meeting with Departmental Representative review and discuss PSPC's waste management goal and Contractor's proposed Waste Reduction Workplan for Construction, Renovation and /or Demolition (CRD) waste to be generated.

.2 Minimize amount of non-hazardous solid waste generated by project and accomplish maximum source reduction, reuse and recycling of solid waste produced by CRD activities.

.3 Protect environment and prevent environmental pollution damage.

1.2 REFERENCE STANDARDS

.1 Ontario 3 R's Regulations (regulation 102/94) for waste management programs applicable to construction and demolition projects greater than 2,000 m2.
  .1 Ontario Environmental Protection Act (EPA)
    .1 Regulation 102/94, Waste Audits and Waste Reduction Workplans.
    .2 Regulation 103/94, Source Separation Programs.

.2 Canadian Construction Association (CCA)
  .1 CCA 81-2001: A Best Practices Guide to Solid Waste Reduction.

.3 Public Services and Procurement Canada (PSPC)
  .1 2002 National Construction, Renovation and Demolition Non-Hazardous Solid Waste Management Protocol.
  .2 CRD Waste Management Market Research Report (available from PWGSC's Environmental Services).

.4 Environmental Protection Act, R.S.O. 1990, Chapter E.19.

.5 R.R.O. 1990, Regulation 347, Amended to O. Reg. 326/03 Waste Management.

.6 Environmental Quality Act (Q-2).

.7 Regulation respecting solid waste (Q-2, r.3.2).

.8 Regulation respecting hazardous materials (Q-2, r.15.2).

.9 Ontario Regulation 102/94 – Waste Audits and Waste Reduction Work Plans.

.10 Ontario Regulation 103/94 – Industrial, Commercial and Institutional Source Separation Programs.

1.3 DEFINITIONS

.1 Approved/Authorized recycling facility: waste recycler approved by applicable provincial authority or other users of material for recycling approved by the Departmental Representative.

.2 Class III: non-hazardous waste - construction renovation and demolition waste.

.3 Inert Fill: inert waste - exclusively asphalt and concrete.

.4 Recyclable: ability of product or material to be recovered at end of its life cycle and re-manufactured into new product for reuse.

.5 Recycle: process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.

.6 Recycling: process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for purpose of using in altered form. Recycling does not include burning, incinerating, or thermally destroying waste.

.7 Reuse: repeated use of product in same form but not necessarily for same purpose. Reuse includes:
.1 Salvaging reusable materials from re- modelling projects, before demolition stage, for resale, reuse on current project or for storage for use on future projects.
.2 Returning reusable items including pallets or unused products to vendors.

.8 Salvage: removal of structural and non-structural materials from deconstruction/disassembly projects for purpose of reuse or recycling.

.9 Separate Condition: refers to waste sorted into individual types.

.10 Source Separation: act of keeping different types of waste materials separate beginning from the point they became waste.

.11 Waste Management Co-ordinator (WMC): contractor representative responsible for supervising waste

management activities as well as co-ordinating required submittal and reporting requirements.

.12 Waste Reduction Workplan (WRW): written report which addresses opportunities for reduction, reuse, or recycling of materials generated by project. Specifies diversion goals, implementation and reporting procedures, anticipated results and responsibilities. Waste Reduction Workplan (Schedule B) information acquired from Waste Audit

1.4 MEASUREMENT AND PAYMENT

.1 No separate measurement for payment shall be made for items under this section. Include cost in the contract Lump Sum Amount.

.2 Payments related to this Section shall be as set out in Section 01 22 01 – Measurement and Payment

1.5 DOCUMENTS

.1 Post and maintain in visible and accessible area at job site, one copy of following documents:
.1 Waste Reduction Workplan.

1.6 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00- Submittal Procedures.

.2 Prepare and submit at least 10 days prior to project start-up:
.1 1 hard copy and 1 electronic copy of completed Waste Reduction Workplan (WRW).

.3 Prepare and submit on monthly basis, throughout project or at intervals agreed to by Departmental Representative the following:

.1 Receipts, scale tickets, waybills, and/or waste disposal receipts that show quantities and types of materials reused, recycled, or disposed of.

1.7 WASTE REDUCTION WORKPLAN (WRW)

.1 Prepare and submit WRW at least 10 days prior to project start-up.

.2 WRW identifies strategies to optimize diversion through reduction, reuse, and recycling of materials and comply with applicable regulations.

.3 WRW should include but not limited to:
- .1 Applicable regulations.
- .2 Specific goals for waste reduction identify existing barriers and develop strategies to overcome them.
- .3 Destination of materials identified.
- .4 Deconstruction/disassembly techniques and schedules.
- .5 Methods to collect, separate, and reduce generated wastes like brick, corrugated cardboard, wood, gypsum board, steel etc.
- .6 Location of waste bins on-site.
- .7 Security of on-site stock piles and waste bins.
- .8 Protection of personnel, sub-contractors.
- .9 Clear labelling of storage areas.
- .10 Training plan for contractor and sub-contractors.
- .11 Methods to track and report results reliably.
- .12 Details on materials handling and removal procedures.
- .13 Recycler and reclaimer requirements.
- .14 Quantities of materials to be salvaged for reuse or recycled and materials sent to landfill.
- .15 Requirements for monitoring on-site wastes management activities.

.4 Structure WRW to prioritize actions and follow 3R's hierarchy, with Reduction as first priority, followed by Reuse, then Recycle.

.5 Post WRW or summary where workers at site are able to review content.

.6 Monitor and report on waste reduction by documenting total volume (in tonnes) and cost of actual waste removed from project.

1.8 USE OF SITE AND FACILITIES

.1 Execute Work with minimal interference and disturbance to normal use of premises.

.2 Maintain security measures established by facility provide temporary security measures approved by Departmental Representative.

1.9 WASTE PROCESSSING SITES

.1 Contractor is responsible to research and locate waste diversion resources and service providers. Salvaged materials are to be transported off site to approved and/or authorized recycling facilities or to users of

material for recycling. Submit proof that all waste is being disposed of at a licensed land fill site or waste transfer site. A copy of the disposal / waste transfer site's license and a letter verifying that said landfill site will accept the waste must be supplied to Departmental Representative prior to removal of waste from the demolition site.

.2 Province of Ontario:
.1 Ministry of Environment, Conservation and Parks
135 St. Clair Avenue West
Toronto, ON, M4V 1P5
Telephone: 800-565-4923 or 416-323-4321
Fax: 416-690-4682
.2 Recycling Council of Ontario
215 Spadina Avenue, #225
Toronto, ON, M5T 2C7
Telephone: 416-657-2797
Fax: 416-960-8053
Email: rco@rco.on.ca
Internet: http://www.rco.on.ca/

1.10 SALVAGE

.1 The Contractor shall salvage and deliver to a location specified by the departmental representative within 100km:
.1 Stop logs and hangers;
.2 Existing dam’s log lifter;
.3 Manual winches;
.4 Safety boom and aerial cable;
.5 Floatation safety rings;
.6 Dam warning and navigation signage.

.2 Delivery of salvage materials include storing, loading, transport and unloading.

.3 Salvage of stop log lifter include dismantling and reassembling of stop log lifter.

.4 Contractor shall savage 20 boulders from rock excavation, if available, for landscaping purposes.
.1 Boulders dimensions to be 1.0 – 2.0 m
.2 Contractor to store and move to locations shown in landscaping drawings.

.5 PCA to maintain ownership of salvaged materials identified in this section.

1.11 QUALITY ASSURANCE

.1 After Award of Contract, a mandatory site examination will be held for this Project for Contractor and/or

sub-contractors responsible for construction, renovation demolition/deconstruction waste management.
.1 Date, time and location will be arranged by Departmental Representative.

.2 Waste Management Meeting: Waste Management Co-ordinator is to provide an update on status of waste diversion and management activities at each meeting.

1.12 STORAGE, HANDLING AND PROTECTION

.1 Store, materials to be reused, recycled and salvaged in locations as directed by Departmental Representative.

.2 Unless specified otherwise, materials for removal becomes Contractor's property.

.3 Protect, stockpile, store and catalogue salvaged items.

.4 Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facility.

.5 Protect structural components not removed and salvaged materials from movement or damage.

.6 Support affected structures. If safety of building is endangered, cease operations and immediately notify Departmental Representative.

.7 Protect surface drainage, mechanical and electrical from damage and blockage.

.8 Provide on-site facilities and containers for collection and storage of reusable and recyclable materials.

.9 Separate and store materials produced during project in designated areas.

.10 Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated processing facilities.
.1 On-site source separation is recommended.
.2 Remove co-mingled materials to off-site processing facility for separation.
.3 Obtain waybills, receipts and/or scale tickets for separated materials removed from site.

.11 Materials reused on-site are considered to be diverted from landfill and as such are to be included in all reporting.

1.13 DISPOSAL OF WASTES

.1 Do not bury rubbish or waste materials.

.2 Do not dispose of oil, mineral spirits, volatile materials, waste, paint thinner into waterways, storm, or sanitary sewers.

.3 Keep records of construction waste including:
.1 Number and size of bins.
.2 Waste type of each bin.
.3 Total tonnage generated.
.4 Tonnage reused or recycled.
.5 Reused or recycled waste destination.

.4 Dispose of contaminated excavated materials in designated areas in accordance with approved EMPP.

.5 Remove materials on-site as Work progresses.

.6 Prepare project summary to verify destination and quantities on a material-by-material basis as identified in the waste audit.

1.14 1.13 TRANSPORTING WASTE MATERIALS

.1 All waste subject to Regulation 558 of the Ontario Environmental Protection Act must be transported with a valid "Certificate of Approval for a Waste Management System" to a site approved by the Ontario Ministry of the Environment, Conservation and Parks to accept that waste.

.2 Be responsible for obtaining all Waste Generator Numbers, permits, manifests, and all other paperwork necessary to comply.

1.15 SCHEDULING

.1 Co-ordinate Work with other activities at site to ensure timely and orderly progress of Work.

1.16 DESIGNATED SUBSTANCE AND HAZARDOUS MATERIALS

.1 Treat designated wastes and hazardous material as per specifications 02 82 10, 02 82 00.01, 02 82 13.13 and 02 82 13,14 presented in the appendix.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used

PART 3 - EXECUTION

3.1 APPLICATION

.1 Do Work in compliance with WRW.

.2 Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.

3.2 CLEANING

.1 Clean in accordance with Section 01 74 11- Cleaning.

3.3 DIVERSION OF MATERIALS

.1 From following list, separate materials from general waste stream and stockpile in separate piles or containers, as reviewed by Departmental Representative and consistent with applicable fire regulations.
.1 Mark containers or stockpile areas.
.2 Provide instruction on disposal practices.

.2 On-site sale of recovered, recyclable, salvaged and reusable materials is not permitted.

END OF SECTION

PART 1 - GENERAL

1.1 MEASUREMENT AND PAYMENT

.1 No separate measurement for payment shall be made for items under this section. Include cost in the contract Lump Sum Amount.

.2 Payments related to this Section shall be as set out in Section 01 22 01 – Measurement and Payment.

1.2 ADMINISTRATIVE REQUIREMENTS

.1 Acceptance of Work Procedures:
  .1 Contractor's Inspection: Contractor and all Subcontractors shall conduct an inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
    .1 Notify Departmental Representative in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.
    .2 Request Departmental Representative’s inspection.
  .2 Departmental Representative Inspection:
    .1 Departmental Representative and Contractor to inspect Work and identify defects and deficiencies.
    .2 Contractor to correct Work as directed.
    .3 Environmental testing to be undertaken by the Contractor at staging areas on PCA lands to confirm that there has been no impact to the soils. Any issues arising from the testing shall be addressed by the Contractor at their expense.
    .4 The Contractor shall provide a release to the Departmental Representative from owners of adjacent lands indicating that there are no impacts to their services and utilities (structure, water, sanitary, storm drainage; electricity, communications…) as a result of the Dam at Lock 28 construction activities.
    .5 The contractor shall provide a release to the Departmental Representative from landowners whose lands have been used as a construction staging area indicating their acceptance of the site clean-up / grading

/restoration even for private and direct deals between contractors and land owners.

.6 The contractor to provide a release from the landowner of Lovesick Lake campground restauration even if the contractor hasn't used the land.

.7 The contractor shall provide to the Departmental Representative the certification that the construction activities have not impacted the structural integrity of the lock and associated including approach walls and retaining walls and boat launch walls.

.8 The contractor shall provide a release to the Departmental Representative from the municipality and/or County and/or for all haul roads in the immediate vicinity of the dam.

.9 The contractor shall provide a release to the Departmental Representative from any waste transfer / receiving station and/or registered landfill as part of the Waste Management Workplan.

.3 Completion Tasks: the Contractor is to sign and submit written certificates in English that tasks have been performed as follows:

.1 Work: completed and inspected for compliance with Contract Documents.

.2 Defects: corrected and deficiencies completed.

.3 Equipment and systems: tested, adjusted and fully operational.

.4 Operation of systems: demonstrated to Owner's personnel.

.5 Work is complete and ready for final inspection.

.4 Final Inspection:

.1 When completion tasks are done, submit new certificates and request final inspection of Work by Departmental Representative and Contractor.

.2 When Work is deemed incomplete according to Departmental

.3 Representative, complete outstanding items and request re-inspection.

.4 The Contractor shall notify the municipality / County, emergency services and any school board regarding the date for reopening haul roads to all traffic.

.5 Upon final acceptance by the Departmental Representative, the contractor shall formally request that the dam operation be taken over by the Parks Canada Agency on a particular date acceptable to the Departmental Representative.

.5 Declaration of Substantial Performance: when Departmental Representative considers deficiencies and defects corrected and requirements of Contract substantially performed, make written application for Certificate of Substantial Performance.

.6 Final Payment

.1 When Departmental Representative considers final deficiencies and defects corrected and requirements of Contract met, make application for final payment.

.2 When work is deemed incomplete by Departmental Representative, complete outstanding items and request re-inspection.

.3 Payment of Holdback: after issuance of Certificate of Substantial Performance of Work, submit application for progressive payment of holdback amount in accordance with contractual agreement.

1.3 FINAL CLEANING

.1 Clean in accordance with Section 01 74 11- Cleaning.

PART 2 - PRODUCT

2.1 NOT USED

.1 Not used

PART 3 - EXECUTION

3.1 NOT USED

.1 Not used

END OF SECTION

PART 1 - GENERAL

1.1 MEASUREMENT AND PAYMENT

.1 No separate measurement for payment shall be made for items under this section. Include cost in the contract Lump Sum Amount.

.2 Payments related to this Section shall be as set out in Section 01 22 01 – Measurement and Payment.

1.2 ADMINISTRATIVE REQUIREMENTS

.1 All project documentation must be submitted to the Departmental Representative within a consolidated Project Manual. Upon review by the Departmental Representative, the Project Manual may need to be revised and resubmitted as necessary.
  .1 Submit within 20 days of completion of work

.2 Pre-warranty Meeting:
  .1 Convene meeting four (4) weeks prior to contract completion with Departmental Representative, in accordance with Section 01 31 19 - PROJECT MEETINGS to:
    .1 Verify Project requirements.
    .2 Review warranty requirements and manufacturer's installation instructions.
  .2 Departmental Representative to establish communication procedures for:
    .1 Notifying of construction warranty defects.
    .2 Determine priorities for type of defects.
    .3 Determine reasonable response time.
  .3 Contact information for bonded and licensed company for warranty work action: provide name, telephone number and address of company authorized for construction warranty work action.
  .4 Ensure contact is located within local service area of warranted construction, is continuously available, and is responsive to inquiries for warranty work action.

1.3 AS -BUILT DOCUMENTS AND SAMPLES

.1 Maintain at site for Departmental Representative one record copy of:
  .1 Contract Drawings.
  .2 Specifications.
  .3 Addenda and amendment.

.4 Change Orders and other modifications to Contract.
.5 Reviewed shop drawings, product data, and samples.
.6 Field test records.
.7 Inspection certificates.
.8 Manufacturer's certificates.

.2 Store record documents and samples in field office apart from documents used for construction.
.1 Provide files, racks, and secure storage.

.3 Label record documents and file in accordance with Section number listings in List of Contents of this Specification.
.1 Label each document "PROJECT RECORD" in neat, large, printed letters.
.2 In addition to the items listed above, include survey drawings and survey data included but not limited to that identified under section 01 71 00- EXAMINATION AND PREPARATION.
.3 Original and as built project schedule including a narrative on variances.
.4 Relevant safety reports including internal and external inspections, hazard analysis and all incident reports.
.5 Environmental reports including incident reports, water quality monitoring records.
.6 Quality information including non-compliance reports, site instructions, requests for information, and testing results.
.7 Include movement and vibration monitoring reports.

.4 Maintain record documents in clean, dry and legible condition.
.1 Do not use record documents for construction purposes.

.5 Keep record documents and samples available for inspection by Departmental Representative.

.6 Turn one set, paper and scanned copy and of red-lined AS-BUILT drawings and specifications over to Departmental Representative on completion of work.

.7 Turn one set, paper copy and electronic copy of record survey drawing and survey data as set out in Section 01 71 00 – EXAMINATION AND PREPARATION over to Departmental Representative on completion of work.

.8 If project is completed without significant deviations from Contract drawings and specifications , submit one set, paper copy and electronic copy, of AS-BUILT

drawings and specifications over to the Departmental Representative on completion of work.

.9 Submit within 20 days of completion of work

1.4 RECORDING INFORMATION TO PROJECT RECORD DOCUMENTS

.1 The Contractor shall maintain project record drawings and record accurately all deviations from the Contract Documents. Record information concurrently with construction progress. Do not conceal work until required information is recorded.

.2 Record changes in red ink. Mark ongoing changes on one set of prints. Then, at the completion of the project and before final inspection, neatly transfer notations to the second set. Submit both sets to the Departmental Representative.

.3 Contract Drawings and shop drawings: legibly mark each item to record actual construction, including:
- .1 Measured depths of elements of foundation in relation to established benchmark.
- .2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
- .3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
- .4 New vertical final elevations.
- .5 Field changes of dimension and detail.
- .6 Changes made by change orders.
- .7 Details not on original Contract Drawings.
- .8 Referenced to related shop drawings and modifications.
- .9 Additional Requirements: as specified in individual specification sections.

.4 Specifications: legibly mark each item to record actual construction, including:
- .1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
- .2 Changes made by Addenda and change orders.

.5 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, contractor monitoring results as set out in Section 01 48 00 - CONSTRUCTION CONTROL AND MONITORING, waste management per Section 01 74 21 – CONSTRUCTION / DEMOLITION WASTE MANAGEMENT AND DISPOSAL as required by specifications sections.

.6 Provide digital photos, if requested, for site records.

.7 Provide all surveys and contractor, or sub contractor, designs in electronic CAD format.

.8 Be prepared to review AS-BUILT Drawings and specifications with Departmental Representative at least weekly to ensure that level of detail being recorded is acceptable. Be advised that during periods of high activity, the Departmental Representative may review AS-BUILT Drawings and specifications even more frequently than weekly.

1.5 FINAL SURVEY

.1 Submit final site survey certificate in accordance with Section 01 71 00- EXAMINATION AND PREPARATION, certifying that elevations and locations of completed Work are in conformance, or non- conformance with Contract Documents.

.2 Submit within 20 days of completion of work

1.6 WARRANTIES AND BONDS

.1 Develop Warranty Management Plan to contain information relevant to Warranties.
.1 Submit 40 days to completion of work.

.2 Submit Warranty Management Plan, fifteen (15) days before planned pre-warranty meeting, to Departmental Representative for approval.

.3 Warranty management plan to include required actions and documents to ensure that Parks Canada receives warranties to which it is entitled.

.4 Provide plan in narrative form and contain sufficient detail to make it suitable for use by future maintenance and repair personnel.

.5 Submit warranty information made available during construction phase to Departmental Representative for approval prior to each monthly pay estimate.

.6 Assemble approved information in binder, submit upon acceptance of work and organize binder as follows:
.1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.
.2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.
.3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and

manufacturers, within ten (10) days after completion of applicable item of work.

.4 Verify that documents are in proper form, contain full information, and are notarized.

.5 Co-execute submittals when required.

.6 Retain warranties and bonds until time specified for submittal.

.7 Except for items put into use with Departmental Representative's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.

.8 Conduct joint nine (9) month warranty inspection, measured from time of acceptance, by Departmental Representative.

.9 Include information contained in warranty management plan as follows:

.1 Roles and responsibilities of personnel associated with warranty process, including points of contact and telephone numbers within the organizations of Contractors, subcontractors, manufacturers or suppliers involved.

.2 Listing and status of delivery of Certificates of Warranty for extended warranty items.

.3 Provide list for each warranted equipment, item, feature of construction or system indicating:

.1 Name of item.

.2 Model and serial numbers.

.3 Location where installed.

.4 Name and phone numbers of manufacturers or suppliers.

.5 Names, addresses and telephone numbers of sources of spare parts.

.6 Warranties and terms of warranty: include one-year overall warranty of construction. Indicate items that have extended warranties and show separate warranty expiration dates.

.7 Cross-reference to warranty certificates as applicable.

.8 Starting point and duration of warranty period.

.9 Summary of maintenance procedures required to continue warranty in force.

.10 Cross-Reference to specific pertinent Operation and Maintenance manuals.

.11 Organization, names and phone numbers of persons to call for warranty service.

.12 Typical response time and repair time expected for various warranted equipment.

.4 Contractor's plans for attendance at 9 month post-construction warranty inspection.

.5 Procedure and status of tagging of equipment covered by extended warranties.

.6 Post copies of instructions near selected pieces of equipment where operation is critical for warranty and/or safety reasons.

.10 Respond in timely manner to oral or written notification of required construction warranty repair work.

.11 Written verification to follow oral instructions.

.1 Failure to respond will be cause for Parks Canada to proceed with action against Contractor.

1.7 WARRANTY TAGS

.1 Tag, at time of installation, each warranted item. Provide durable, oil and water resistant tag approved by Departmental Representative.

.2 Attach tags with copper wire and spray with waterproof silicone coating.

.3 Leave date of acceptance until project is accepted for occupancy.

.4 Indicate following information on tag:

.1 Type of product/material.

.2 Model number.

.3 Serial number.

.4 Contract number.

.5 Warranty period.

.6 Inspector's signature.

.7 Construction Contractor

1.8 MATERIALS AND FINISHES

.1 Provide information for re-ordering custom manufactured products.

.2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

.3 Moisture-protection and weather-exposed products: include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

.4 Additional requirements: as specified in individual specifications sections.

1.9 MAINTENANCE MATERIALS

.1 Spare Parts:
- .1 Provide spare parts, in quantities specified in individual specification sections.
- .2 Provide items of same manufacture and quality as items in Work.
- .3 Deliver to location as directed; place and store.
- .4 Receive and catalogue all items.
  - .1 Submit inventory listing to Departmental Representative.
  - .2 Include approved listings in Maintenance Manual.
- .5 Obtain receipt for delivered products and submit prior to final payment.

.2 Extra Stock Materials:
- .1 Provide maintenance and extra materials, in quantities specified in individual specification sections.
- .2 Provide items of same manufacture and quality as items in Work.
- .3 Deliver to location as directed; place and store.
- .4 Receive and catalogue items.
  - .1 Submit inventory listing to Departmental Representative.
  - .2 Include approved listings in Maintenance Manual.
- .5 Obtain receipt for delivered products and submit prior to final payment.

.3 Special Tools:
- .1 Provide special tools, in quantities specified in individual specification section.
- .2 Provide items with tags identifying their associated function and equipment.
- .3 Deliver to location as directed; place and store.
- .4 Receive and catalogue items.
  - .1 Submit inventory listing to Departmental Representative.
  - .2 Include approved listings in Maintenance Manual.

1.10 DELIVERY, STORAGE AND HANDLING

.1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration until delivery at PCA's facilities at 2155 Ashburnham or within 100 km of worksite.

.2 Store in original and undamaged condition with manufacturer's seal and labels intact.

.3 Store components subject to damage from weather in weatherproof enclosures.

.4 Store paints and freezable materials in a heated and ventilated room.

.5 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.

1.11 OPERATION AND MAINTENANCE MANUAL

.1 Provide comprehensive Operation and Maintenance (O&M) Manual in English.
.1 Submit 40 days prior to completion of work

.2 Break down O&M Manual into Parts by system. Then within those parts, the Sections should be by equipment. Further subdivision is acceptable if Contractor feels this is necessary for clarity.

.3 For each system, describe normal operating procedures, emergency operating procedures, winterizing procedures, spring start-up procedures, and inspection procedures. Identify and assess safety and ergonomic hazards for dam operators and develop safe work procedures to address these hazards. Ensure that procedures developed meet Section 19 of the Canadian Occupational Health and Safety Regulations.

.4 For each piece of equipment, describe maintenance procedures and repair procedures.

.5 Write all procedures as instructions to the dam operators.

.6 Annexes to O&M Manual must contain:
.1 A final set of dam drawings updated to "as built" status.
.2 A list of make and model numbers for all equipment, fittings, accessories, ancillary equipment, and all other systems.
.3 A list of recommended store of spare parts, maintenance materials, and special tools to be kept on hand at all times. Provide make and model number of all parts, either here or by cross-reference to OEM-supplied manuals.
.4 A full set of OEM-supplied owners' manuals, maintenance manuals, and schematics.
.5 Departmental Representative expects this written work to be of highest professional quality. Submit draft copy (either electronic or

hardcopy) no less than 4 weeks before the anticipated start of Commissioning. Allow 10 days for Departmental Representative to review. Make changes as directed and resubmit until acceptance. Acceptance criteria:

.1 Manual is complete in all its parts, organized appropriately to serve its purposes, correct in matters of fact and documentation, and edited for grammar and basic uniformities of style and usage.

.2 Instructions to dam operators are written in active voice, lest passive voice makes it unclear as to who is to do action.

.3 For tasks beyond scope of what dam operators themselves can do, manual directs dam operators to contact the appropriate trade.

PART 2 - PRODUCT

2.1 NOT USED

.1 Not used

PART 3 - EXECUTION

3.1 NOT USED

.1 Not used

END OF SECTION

PART 1 - GENERAL

1.1 DESCRIPTION

.1 Section Includes:
  .1 General requirements relating to commissioning of project's components and systems, specifying general requirements to Performance Verification of components, equipment, sub-systems, systems, and integrated systems.

.2 Acronyms:
  .1 Cx - Commissioning.
  .2 O&M - Operation and Maintenance.
  .3 PI - Product Information.
  .4 PV - Performance Verification.
  .5 TAB - Testing, Adjusting and Balancing.

1.2 MEASURMENT AND PAYMENT

.1 No separate measurement for payment shall be made for Commissioning. All work shall be included in the contract Lump Sum Amount.

.2 Payment shall be made as set in Section 01 22 01 – MESURAMENT AND PAYMENT in the appropriate work item.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submittals: in accordance with Section 01 33 00- SUBMITTAL PROCEDURED.
  .1 Submit at least 12 weeks prior to start of Cx:
    .1 Name of Contractor's Cx agent.
    .2 Draft Cx documentation.
    .3 Preliminary Cx schedule.
  .2 Request in writing to Departmental Representative for changes to submittals and obtain written approval at least 8 weeks prior to start of Cx.
  .3 Submit proposed Cx procedures to Departmental Representative where not specified and obtain written approval at least 8 weeks prior to start of Cx.
  .4 Provide additional documentation relating to Cx process required by Departmental Representative.
  .5 The Plan must incorporate as a minimum:
    .1 Importance of the Commissioning Plan
    .2 Roles and responsibilities
    .3 Revisions to this Commissioning Plan
    .4 Risk assessment
    .5 Objectives of commissioning
    .6 Extent of commissioning

.7 Deliverables relating to O&M perspectives
.8 Deliverables relating to the commissioning process
.9 Deliverables relating to the administration of commissioning
.10 The commissioning process
.11 Training Plan.

.2 The Contractor’s Commissioning Plan is to be modeled as described on the PSPC National Project Management System (NPMS) Commissioning Manual.

1.4 GENERAL

.1 Cx is a planned program of tests, procedures and checks carried out systematically on systems and integrated systems of the finished Project. Cx is performed after systems and integrated systems are completely installed, functional and Contractor's Performance Verification responsibilities have been completed and approved. Objectives:
.1 Verify installed equipment, systems and integrated systems operate in accordance with Contract Documents and design criteria and intent.
.2 Ensure appropriate documentation is compiled into the O&M manuals.
.3 Effectively train O&M staff.

.2 Contractor assists in Cx process, operating equipment and systems, troubleshooting and making adjustments as required.
.1 Systems to be operated at full capacity under various modes to determine if they function correctly and consistently at peak efficiency. Systems to be interactive with each other as intended in accordance with Contract Documents and design criteria.
.2 During these checks, adjustments to be made to enhance performance to meet environmental or user requirements.

.3 Design Criteria: as per client's requirements or determined by designer. To meet Project functional and operational requirements.

1.5 COMMISSIONING OVERVIEW

.1 Cx activities supplement field quality and testing procedures described in relevant technical sections.

.2 Cx is conducted in concert with activities performed during stage of project delivery. Cx identifies issues in Planning and Design stages which are addressed during Construction and Cx stages to ensure the built

facility is constructed and proven to operate satisfactorily under weather, environmental and occupancy conditions to meet functional and operational requirements. Cx activities includes transfer of critical knowledge to facility operational personnel.

.3 Departmental Representative will issue Interim Acceptance Certificate when:
- .1 Completed Cx documentation has been received, reviewed for suitability and approved by Departmental Representative.
- .2 Equipment, components and systems have been commissioned.
- .3 O&M training has been completed.

1.6 COMISSIONING STAGES

.1 The following commissioning stages are to be considered:
- .1 Temporary works on existing dam:
  - .1 Dry commissioning of each of the 5 modified sluices including: lower logs operation using gantry crane, upper log operation using log lifter, gain heaters
  - .2 Wet commissioning (behind bulkheads) of each of the 5 modified sluices including: lower logs operation using gantry crane, upper log operation using log lifter, gain heaters
    1. Stage 1, wet commissioning with dewatering system in place
    2. Stage 2, wet commissioning with dewatering system removed.
  - .3 Commission modified sluices as ready to mobilize flow capacity as soon as possible.
- .2 Safety boom
  - .1 Initial temporary installation
  - .2 Final location installation
- .3 New dam phase 2
  - .1 Dry commissioning of sluices
  - .2 Wet commissioning of sluices and gravity dam, prior to existing structure demolition and cofferdam removal (include leak test of structure and sluices, operation of log lifter, gain covers, etc.)
    1. Leak test include a maximum of 3 liter/minute/meter (200 l/min per sluice with all logs in place).
    2. Leak test include no (0 liter/minute) leaks in the structure or structure foundation
- .4 New dam phase 3
  - .1 Dry commissioning of sluices

.2 Wet commissioning of sluices and gravity dam, prior to existing structure demolition and cofferdam removal (include leak test of structure and sluices, operation of log lifter, gain covers, etc.)
3. Leak test include a maximum of 3 liter/minute/meter (200 l/min per sluice with all logs in place).
4. Leak test include no (0 liter/minute) leaks in the structure or structure foundation

.5 Log lifter:
.1 Witness and accept commissioning of new log lifter at another site (within 100km)
.2 Witness and acceptance of new log lifter at another site (within 100km) prior to transportation by contractor.
1. Contractor to disassemble and reassemble log lifter if required.
.3 Commissioning of new log lifter at site following transport and installation by contractor

1.7 NON-CONFORMANCE TO PERFORMANCE VERIFICATION REQUIREMENTS

.1 Should equipment, system components, and associated controls be incorrectly installed or malfunction during Cx, correct deficiencies, re-verify equipment and components within the unfunctional system, including related systems as deemed required by Departmental Representative, to ensure effective performance.

.2 Costs for corrective work, additional tests, inspections, to determine acceptability and proper performance of such items to be borne by Contractor. Above costs to be in form of progress payment reductions or hold-back assessments.

1.8 PRE-CX REVIEW

.1 Before Construction:
.1 Review Contract Documents, confirm by writing to Departmental Representative.
.1 Adequacy of provisions for Cx.
.2 Aspects of design and installation pertinent to success of Cx.

.2 During Construction:
.1 Co-ordinate provision, location and installation of provisions for Cx.

.3 Before start of Cx:

.1 Have completed Cx Plan up-to-date.
.2 Ensure installation of related components, equipment, sub-systems, systems is complete.
.3 Fully understand Cx requirements and procedures.
.4 Have Cx documentation shelf-ready.
.5 Understand completely design criteria and intent and special features.
.6 Submit complete start-up documentation to Departmental Representative.
.7 Have Cx schedules up-to-date.
.8 Ensure systems have been cleaned thoroughly.
.9 Complete TAB procedures on systems, submit TAB reports to Departmental Representative for review and approval.
.10 Ensure "As-Built" system schematics are available.

.4 Inform Departmental Representative in writing of discrepancies and deficiencies on finished works.

1.9 CONFLICTS

.1 Report conflicts between requirements of this section and other sections to Departmental Representative before start-up and obtain clarification.

.2 Failure to report conflict and obtain clarification will result in application of most stringent requirement.

1.10 COMMISSIONING DOCUMENTATION

.1 Departmental Representative to review and approve Cx documentation.

.2 Provide completed and approved Cx documentation to Departmental Representative.

1.11 COMMISSIONING SCHEDULE

.1 Provide detailed Cx schedule as part of construction schedule in accordance with Section 01 32 16.07 – CONSTRUCTION PROGRESS SCHEDULE.

.2 Provide adequate time for Cx activities prescribed in technical sections and commissioning sections including:
.1 Approval of Cx reports.
.2 Verification of reported results.
.3 Repairs, retesting, re-commissioning, re-verification.
.4 Training.

1.12 COMMISSIONING MEETINGS

.1 Convene Cx meetings following project meetings: Section 01 32 16.17 - CONSTRUCTION PROGRESS SCHEDULE and as specified herein.

.2 Purpose: to resolve issues, monitor progress, identify deficiencies, relating to Cx.

.3 Continue Cx meetings on regular basis until commissioning deliverables have been addressed.

.4 At 60% construction completion stage. Section 01 32 16 - CONSTRUCTION PROGRESS SCHEDULE, call a separate Cx scope meeting to review progress, discuss schedule of equipment start-up activities and prepare for Cx. Issues at meeting to include:
.1 Review duties and responsibilities of Contractor and subcontractors, addressing delays and potential problems.
.2 Determine the degree of involvement of trades and manufacturer's representatives in the commissioning process.

.5 Thereafter Cx meetings to be held until project completion and as required during equipment start-up and functional testing period.

.6 Contractor, who will record and distribute minutes, will chair meeting

.7 Ensure Contractor’s subs and relevant manufacturer representatives are present at 60% and subsequent Cx meetings and as required.

1.13 STARTING AND TESTING

.1 Contractor assumes liabilities and costs for inspections. Including disassembly and re-assembly after approval, starting, testing and adjusting, including supply of testing equipment.

1.14 WITNESSING OF STARTING AND TESTING

.1 Provide 14 days notice prior to commencement.

.2 Departmental Representative to witness of start-up and testing.

.3 Contractor's Cx Agent to be present at tests performed and documented by sub-trades, suppliers and equipment manufacturers.

1.15 MANUFACTURER'S INVOLVEMENT

.1 Factory testing: manufacturer to:
  .1 Coordinate time and location of testing.
  .2 Provide testing documentation for approval by Departmental Representative.
  .3 Arrange for Departmental Representative to witness tests.
  .4 Obtain written approval of test results and documentation from Departmental Representative before delivery to site.

.2 Obtain manufacturers installation, start-up and operations instructions prior to start-up of components, equipment and systems and review with Departmental Representative:
  .1 Compare completed installation with manufacturer's published data, record discrepancies, and review with manufacturer.
  .2 Modify procedures detrimental to equipment performance and review same with manufacturer before start-up.

.3 Integrity of warranties:
  .1 Use manufacturer's trained start-up personnel where specified elsewhere in other divisions or required to maintain integrity of warranty.
  .2 Verify with manufacturer that testing as specified will not void warranties.

.4 Qualifications of manufacturer's personnel:
  .1 Experienced in design, installation and operation of equipment and systems.
  .2 Ability to interpret test results accurately.
  .3 To report results in clear, concise, logical manner.

1.16 PROCEDURES

.1 Verify that equipment and systems are complete, clean, and operating in normal and safe manner prior to conducting start-up, testing and Cx.

.2 Conduct start-up and testing in following distinct phases:
  .1 Included in delivery and installation:
    .1 Verification of conformity to specification, approved shop drawings and completion of PI report forms.
    .2 Visual inspection of quality of installation.
  .2 Start-up: follow accepted start-up procedures.
  .3 Operational testing: document equipment performance.

.4 System PV: include repetition of tests after correcting deficiencies.
.5 Post-substantial performance verification: to include fine-tuning.

.3 Correct deficiencies and obtain approval from Departmental Representative after distinct phases have been completed and before commencing next phase.

.4 Document require tests on approved PV forms.

.5 Failure to follow accepted start-up procedures will result in re-evaluation of equipment by an independent testing agency selected by Departmental Representative. If results reveal that equipment start-up was not in accordance with requirements, and resulted in damage to equipment, implement following:
.1 Minor equipment/systems: implement corrective measures approved by Departmental Representative.
.2 Major equipment/systems: if evaluation report concludes that damage is minor, implement corrective measures approved by Departmental Representative.
.3 If evaluation report concludes that major damage has occurred, Departmental Representative shall reject equipment.
.1 Rejected equipment to be removed from site and replace with new.
.2 Subject new equipment/systems to specified start-up procedures.

1.17 START-UP DOCUMENTATION

.1 Assemble start-up documentation and submit to Departmental Representative for approval before commencement of commissioning.

.2 Start-up documentation to include:
.1 Factory and on-site test certificates for specified equipment.
.2 Pre-start-up inspection reports.
.3 Signed installation/start-up check lists.
.4 Start-up reports,
.5 Step-by-step description of complete start-up procedures, to Departmental Representative to repeat start-up at any time.

1.18 OPERATION AND MAINTENANCE OF EQUIPMENT AND SYSTEMS

.1 Provide demonstration of operation and maintenance of equipment to PCA operations staff in conjunction with equipment manufacturer.

.2 With assistance of manufacturer develop written maintenance program and submit to Departmental Representative for approval before implementation.

.3 Operate and maintain systems for length of time required for commissioning to be completed.

.4 After completion of commissioning, operate and maintain systems until issuance of certificate of interim acceptance.

1.19 TEST RESULTS

.1 If start-up, testing and/or PV produce unacceptable results, repair, replace or repeat specified starting and/or PV procedures until acceptable results are achieved.

.2 Provide manpower and materials, assume costs for re-commissioning.

1.20 START OF COMMISSIONING

.1 Notify Departmental Representative at least 21 days prior to start of Cx.

.2 Start Cx after elements of structures affecting start-up and performance verification of systems have been completed.

1.21 INSTRUMENTS / EQUIPMENT

.1 Provide the following equipment as required:
.1 Ladders.
.2 Equipment as required to complete work.

1.22 COMMISSIONING PERFORMANCE VERIFICATION

.1 Carry out Cx:
.1 Under accepted simulated operating conditions, over entire operating range, in all modes.
.2 On independent systems and interacting systems.

.2 Cx procedures to be repeatable and reported results are to be verifiable.

.3 Follow equipment manufacturer's operating instructions.

.4 EMCS trending to be available as supporting documentation for performance verification.

1.23 WITNESSING COMMISSIONING

.1 Departmental Representative to witness activities and verify results.

1.24 AUTHORITIES HAVING JURISDICTION

.1 Where specified start-up, testing or commissioning procedures duplicate verification requirements of authority having jurisdiction, arrange for authority to witness procedures so as to avoid duplication of tests and to facilitate expedient acceptance of facility.

.2 Obtain certificates of approval, acceptance and compliance with rules and regulation of authority having jurisdiction.

.3 Provide copies to Departmental Representative within 5 days of test and with Cx report.

1.25 EXTRAPOLATION OF RESULTS

.1 Where Cx of weather, occupancy, or seasonal-sensitive equipment or systems cannot be conducted under near-rated or near-design conditions, extrapolate part-load results to design conditions when approved by Departmental Representative in accordance with equipment manufacturer's instructions, using manufacturer's data, with manufacturer's assistance and using approved formulae.

1.26 EXTENT OF VERIFICATION

.1 Elsewhere:
.1 Provide manpower to verify up to 30% of reported results, unless specified otherwise in other sections.

.2 Number and location to be at discretion of Departmental Representative.

.3 Conduct tests repeated during verification under same conditions as original tests, using same test equipment.

.4 Review and repeat commissioning of systems if inconsistencies found in more than 20% of reported results.

.5 Perform additional commissioning until results are acceptable to Departmental Representative.

1.27 REPEAT VERIFICATIONS

.1 Assume costs incurred by Departmental Representative for third and subsequent verifications where:
- .1 Verification of reported results fail to receive Departmental Representative's approval.
- .2 Repetition of second verification again fails to receive approval.
- .3 Departmental Representative deems Contractor's request for second verification was premature.

1.28 SUNDRY CHECKS AND ADJUSTMENTS

.1 Make adjustments and changes which become apparent as Cx proceeds.

.2 Perform static and operational checks as applicable and as required.

1.29 DEFICIENCIES, FAULTS, DEFECTS

.1 Correct deficiencies found during start-up and Cx to satisfaction of Departmental Representative.

.2 Report problems, faults or defects affecting Cx to Departmental Representative in writing. Stop Cx until problems are rectified. Proceed with written approval from Departmental Representative.

1.30 COMPLETION OF COMMISSIONING

.1 Upon completion of Cx leave systems in normal operating mode.

.2 Except for warranty and seasonal verification activities specified in Cx specifications, complete Cx prior to issuance of Interim Certificate of Completion.

.3 Cx to be considered complete when contract Cx deliverables have been submitted and accepted Departmental Representative.

1.31 ACTIVITIES UPON COMPLETION OF COMMISSIONING

.1 When changes are made to baseline components or system settings established during Cx process, provide updated Cx form for affected item.

1.32 MAINTENANCE MATERIALS, SPARE PARTS, SPECIAL TOOLS

.1 Supply, deliver, and document maintenance materials, spare parts, and special tools as specified in contract.

1.33 OCCUPANCY

.1 Cooperate fully with Departmental Representative during stages of acceptance and occupancy of facility.

1.34 PERFORMANCE VERIFICATION TOLERANCES

.1 Refer to section 35 20 17.01 – TEMPORARY STOP LOGS, SILLS AND GAINS and 35 20 17.02 – TIMBER STOP LOGS, SILLS AND GAINS.

1.35 OWNER'S PERFORMANCE TESTING

.1 Performance testing of equipment or system by Departmental Representative will not relieve Contractor from compliance with specified start-up and testing procedures.

PART 2 - PRODUCT

2.1 NOT USED

.1 Not used

PART 3 - EXECUTION

3.1 NOT USED

.1 Not used

END OF SECTION

PART 1 - GENERAL

1.1 DESCRIPTION

.1 This section specifies the requirement for mechanical demolition to complete work as indicated.

.2 Work includes but is not limited to:
  .1 Phase 1 - Existing dam local demolition: saw cutting, local demolition and preparation of surfaces of surfaces against which new concrete is to be cast in the locations and to the depths as shown on the Drawings.
  .2 Phases 2 and 3 - Complete demolition of the existing dam, according to the sequences shown on the Drawings.
  .3 Demolition of the existing house located on the left bank of the dam.

1.2 REFERENCES

.1 CSA International
  .1 CSA S350-M1980(R2003), Code of Practice for Safety in Demolition of Structures.

.2 National Building Code of Canada (NBC) including User's Guide, Division B,
  .1 Part 8 – Safety Measures at Construction and Demolition Sites (2015).

.3 Ontario Occupational Health and Safety Act (OHSA).

1.3 MEASUREMENT AND PAYMENT PROCEDURES

.1 Measurement Procedures: in accordance with Section 01 22 01 – MEASUREMENT AND PAYMENT.

1.4 DEFINITIONS

.1 Hazardous Materials: dangerous substances, dangerous goods, hazardous commodities and hazardous products, include but not limited to: poisons, corrosive agents, flammable substances, ammunition, explosives, radioactive substances, or materials that endanger human health or environment if handled improperly.

.2 Waste Management Co-ordinator (WMC): contractor representative responsible for supervising waste management activities as well as co-ordinating related, required submittal and reporting requirements.

.3 Waste Audit (WA): detailed inventory of materials in building. Involves quantifying by volume/weight amounts of materials and wastes generated during construction, demolition, deconstruction, or renovation project. Indicates quantities of reuse, recycling and landfill.

.4 Waste Reduction Workplan (WRW): written report which addresses opportunities for reduction, reuse, or recycling of materials. WRW is based on information acquired from WA.

1.5 ADMINISTRATIVE REQUIREMENTS

.1 Scheduling:
- .1 Employ necessary means to meet project time lines without compromising specified minimum rates of material diversion.
- .2 In event of unforeseen delay notify in writing Departmental Representative.

.2 Reporting:

- .1 Through data gathered from weigh bill or other methodology approved by the Departmental Representative, report the following information weekly to the satisfaction of the Departmental Representative:
  - .1 Description of material;
  - .2 Weight, quantity of material;
  - .3 Breakdown of re-use, recycling and landfill quantities;
  - .4 End destination of material.

1.6 SUBMITTALS PROCEDURES

.1 Four (4) weeks prior to beginning of Work, submit in accordance with Section 01 33 00 - SUBMITTAL PROCEDURES.

.2 Detailed Demolition plan describing equipment and procedures to be used for each construction phase to demolish existing concrete and remove it from the site.
- .1 Include measures for preventing damage to adjacent or nearby structures.

.3 Detailed Waste Reduction Workplan in accordance with Section 01 74 21 – WASTE MANAGEMENT AND DISPOSAL and indicate:
- .1 Descriptions and anticipated quantities of materials to be recycled and landfilled.
- .2 Number and location of dumpsters.

.3 Anticipated frequency of tippage
.4 Name and address of haulers and waste facilities.
.5 Receiving facilities of material containing potential hazardous material. These materials are to be diagnosed in accordance with applicable regulations and not be designated for re-use.
.1 Painted steel may contain lead.

.4 Shop Drawings:
.1 Provide drawings stamped and signed by Professional Engineer registered or licensed in Province of Ontario, Canada.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Waste Management and Disposal:
.1 Separate waste materials for recycling in accordance with Section 01 74 21 – WASTE MANAGEMENT AND DISPOSAL.

1.8 SITE CONDITIONS

.1 Review existing site conditions and take necessary precautions to protect environment.

.2 Ensure Work is done in accordance with Section 01 35 43 - ENVIRONMENTAL PROCEDURES and Section 01 35 46 – ARCHAEOLOGICAL AND CULTURAL PROCEDURES.

.3 Ensure Work does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air and noise pollution.

.4 Do not bury rubbish waste materials.

.5 Do not dispose of waste or volatile materials including but not limited to: mineral spirits, oil, petroleum based lubricants, or toxic cleaning solutions into watercourses, storm or sanitary sewers.
.1 Ensure proper disposal procedures are maintained throughout project.

.6 Do not pump water containing suspended materials into watercourses, storm or sanitary sewers, or onto adjacent properties.

.7 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with authorities having jurisdiction as directed by Departmental Representative.

.8 Protect trees, plants and foliage on site and adjacent properties where indicated.

.9 Prevent extraneous materials from contaminating air beyond application area, by providing temporary enclosures during demolition work.

.10 Cover or wet down dry materials and waste to prevent blowing dust and debris. Control dust on all temporary roads.

1.9 EXISTING SITE AND STRUCTURE PROTECTION

.1 Protect existing items designated to remain and items designated for salvage. In event of damage to such items, immediately replace or make repairs to approval of Departmental Representative and at no cost to Departmental Representative.

.2 Remove and store materials to be salvaged, in manner to prevent damage and in accordance with requirements for maximum preservation of material.

.3 Provide a pre-construction condition survey and assessment of the lock and related structures and infrastructure, utilities and services in accordance with Section 01 48 00 - CONSTRUCTION CONTROL AND MONITORING.

.4 Provide Instrumentation at and adjacent to structures to remain, to monitor movement (displacement) including settlement in area of excavation and at temporary works, to monitor vibration levels of construction activities in accordance with Section 01 48 00 - CONSTRUCTION CONTROL AND MONITORING.

.1 Monitoring to cover existing structure, newly built structures and temporary structurers including cofferdams.

.5 Instrumentation equipment has to be installed, calibrated and initial reading taken prior to commencement of demolition work.

.6 Prevent movement, settlement or damage to adjacent structures during demolition of the existing dam. Provide bracing, shoring or underpinning or such other measures as required and approved by the Departmental Representative. Repair damage caused by demolition as approved by Departmental Representative.

.7 Support affected structures and, if safety of structure being demolished or adjacent structures

appears to be endangered, take preventative measures and notify the Departmental Representative.

.8 Acceptance by the Departmental Representative does not relieve the Contractor of their due diligence and responsibility for protection of other site works including salvaged materials.

PART 2 - PRODUCTS

2.1 EQUIPMENT

.1 Leave machinery running only while in use, except where extreme temperatures prohibit shutting machinery down.

.2 For Phase 1 localized demolition on existing dam, size of demolition equipment shall be limited to 15 kg jack hammer for chutes demolition and 7 kg jack hammer for piers demolition prior to installation of new gains. Use of hoe ram on the existing dam for Phase 1 demolition is prohibited.

.3 Equipment shall be sized adequately for the work. Machinery used for concrete demolition must be chosen to minimize airborne pollution

PART 3 - EXECUTION

3.1 GENERAL

.1 Carry out mechanical demolition in accordance with CSA S350.

3.2 PREPARATION

.1 Prior to demolition of the existing structure, establish reference points (minimum of 4) that will allow the transfer of coordinates and elevations of the existing structure’s geodetic bench mark to the new geodetic bench mark on the new structure, or as approved by the Department Representative.
.1 Provide all survey data regarding the reference points to the Departmental Representative.

.2 Protection of in-place conditions:

.1 Work in accordance with Section 01 35 43- ENVIRONMENTAL PROCEDURES AND SECTION 01 35 46 - ARCHAEOLOGICAL AND CULTURAL PROCEDURES.
.2 Protect existing site works designated to remain and materials designated for salvage. In event

of damage, immediately replace such items or make repairs to the satisfaction of the Departmental Representative and at no additional cost to the Agency.

.3 Provide a pre-construction condition survey and assessment of the Dam and related structures and infrastructure, utilities and services in accordance with Section 01 48 00 - CONSTRUCTION CONTROL AND MONITORING.

.4 Provide Instruction at and adjacent to structures to remain, to monitor movement (displacement) including settlement in area of excavation and at temporary works, to monitor vibration levels of construction activities and to monitor water levels of water of domestic water wells, in accordance with Section 01 48 00 – CONSTRUCTION CONTROL AND MONITORING. Instrumentation equipment has to be installed, calibrated and initial reading taken prior to commencement of demolition work.

.5 Prevent movement, settlement or damage of adjacent walks, services, properties adjacent grades, structures, trees, parts of existing building to remain, landscaping, and paving during demolition of the dam.

.1 Provide bracing, shoring, underpinning or such measures as required and approved by the Departmental Representative.

.2 Repair damage caused by demolition as directed by Departmental Representative.

.6 Support affected structures and, if safety of structure being demolished or adjacent structures appears to be endangered, take preventative measures, stop Work and immediately notify Departmental Representative.

.7 Prevent debris from blocking surface drainage system and navigation channel, which must remain in operation.

.8 Protect layout and reference and control points during demolition work.

.9 Provide measures as necessary to protect the lock and ancillary works during demolition works acceptable to the Departmental Representative. Acceptance by Departmental Representative does not relieve the Contractor of their due diligence and responsibility for protection of other site works including salvaged materials.

.3 Preparation:

.1 Disconnect and re-route electrical service lines near the dam to be demolished.

.1 Post warning signs on electrical lines and equipment which must remain energized to serve other properties during period of demolition.

.2 Do not disrupt active or energized utilities designated to remain undisturbed and/or traversing premises.
.3 Inspect site and verify with the Departmental Representative
.4 Work in accordance with Section 01 35 43- ENVIRONMENTAL PROCEDURES

3.3 DEMOLITION

.1 Obtain approval from the Departmental Representative prior to undertaking demolition.

.2 Protect structural integrity of existing features to remain in place. Also ensure that demolition works will not affect integrity of temporary structures such as shoring, cofferdams, etc.

.3 Ensure the methodology of demolition will not result in physical or structural damage to the site works, lock components and buildings, infrastructures including water wells, within and adjacent to the approved construction limits.
.1 Demonstrate to the Departmental Representative that other site works have not been physically or structurally damaged as a result of demolition works, to requirements of Section 01 48 00 – CONSTRUCTION CONTROL AND MONITORING.
.2 If demolition work results in physical or structural damage to the site works, lock components and buildings, infrastructures including water wells, within and adjacent to the construction limits, contractor must repair to original condition at own cost.
.3 Provide for approval by the Departmental Representative, a methodology for repairing damage to other site works.
.4 Upon approval by the Departmental Representative, undertake repair work to the satisfaction of the Departmental Representative.

.4 For Phase 1 localized demolition, delimit the demolition zone with a saw cut to minimum depth 50mm.

.5 Use small, hand operated chippers, 30 lbs maximum, for demolition starting at sawcut 1 m away from existing features.

.6 Remove contaminated or dangerous materials as defined by authorities having jurisdiction, relating to environmental protection, from site and dispose of in safe manner to minimize danger at site or during disposal.

.7 Treat designated wastes and hazardous material as per specifications 02 82 10, 02 82 00.01, 02 82 13.13 and 02 82 13,14 presented in the appendix or as per local regulation whichever is more stringent.

.8 Remove items to be reused, store as directed by Departmental Representative, and re-install construction is completed.

.9 Dispose of removed materials, to appropriate recycling facilities except where specified otherwise, in accordance with authority having jurisdiction.

.10 Crush concrete generated due to demolition of structure to size suitable for recycling

.1 Remove structural framing and supports, misc. metals, wood materials including cutoff sheeting and piles, and other non-concrete items.
.2 For further information regarding acceptable uses contact Provincial/Territorial aggregate producers associations and or Ministries of Transportation.

.11 Use natural lighting to do Work where possible.
.1 Shut off lighting except those required for security purposes at end of each day.

.12 At end of each day's work, leave Work in safe and stable condition.

.13 Demolish to minimize dusting. Keep materials wetted as directed by Departmental Representative.

.14 Blasting operations not permitted during demolition.

3.4 SURFACE PREPARATION

.1 Prepare existing concrete surfaces to receive new concrete in accordance with Section 03 30 00 - CAST-IN-PLACE AND PRECAST CONCRETE.

3.5 STOCKPILING

.1 Stockpile materials designated for alternate disposal in location which facilitates removal from site and examination by potential end markets, and which does not impede disassembly, processing, or hauling procedures.

.2 Locate stockpiled materials convenient for use in new construction. Eliminate double handling wherever possible.

3.6 REMOVAL FROM SITE

.1 Transport material designated for alternate disposal to approved facilities listed in waste reduction workplan and in accordance with applicable regulations. Do not deviate from facilities listed in waste reduction workplan without prior written authorization from Departmental Representative.

.2 Dispose of materials not designated for alternate disposal in accordance with applicable regulations. Disposal facilities must be approved of and listed in waste reduction workplan. Do not deviate from disposal facilities listed in waste reduction workplan without prior written authorization from Departmental Representative.

3.7 CLEANING

.1 Waste Management: separate materials for reuse on new structure in accordance with 01 74 21- CONSTRUCTION/DEMOLITION WASTE MANAGEMENT AND DISPOSAL.

.2 Clean in accordance with 01 74 11 - CLEANING

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 03 20 00 - CONCRETE REINFORCING

.2 Section 03 30 00 - CAST-IN-PLACE AND PRECAST CONCRETE

.3 Section 03 35 00 - CONCRETE FINISHING

1.2 REFERENCES

.1 ASTM International
  .1 ASTM D5864-18, Standard Test Method for Determining Aerobic Aquatic Biodegradation of Lubricants or their Components.

.2 Canadian Standards Association (CSA International)
  .1 CSA A23.1:19/A23.2:19, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
  .2 CSA A23.4-16, Precast Concrete - Materials and Construction.
  .3 CSA O86-19, Engineering Design in Wood.
  .4 CSA O121-17, Douglas Fir Plywood.
  .5 CSA O151-17, Canadian Softwood Plywood.
  .6 CSA O325-16, Construction Sheathing.
  .7 CSA S269.1-16, Falsework and Formwork.

.3 Underwriters Laboratories of Canada
  .1 CAN/ULC-S701-17, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Four (4) weeks prior to beginning of Work, submit in accordance with Section 01 33 00 - SUBMITTAL PROCEDURES.

.2 Shop drawings for formwork and falsework.
  .1 Submit drawings stamped and signed by professional engineer registered or licensed in the Province of Ontario, Canada.
  .2 Shop Drawings must bear certificate of conformance signed by the QVE.
  .3 Indicate method and schedule of construction, shoring, stripping and re-shoring procedures, materials, arrangement of joints, exposed finishes, ties, liners and locations of embedded parts and waterstops.

.4 Indicate each joint type and include elevation or section takes through the plane of the joint, showing details of joint fillers, sealant, adhesives other appurtenances.

.5 Indicate details of waterstop system, types, splices, methods of securing and supporting waterstop in forms to maintain proper orientation and location during concrete placement.

.6 Comply with CSA S269.1, for falsework drawings and formwork drawings.

.7 Indicate formwork design data: permissible rate of concrete placement, and temperature of concrete, in forms. Also indicate whether the use of plasticizers is considered in the formwork design loads.

.8 Indicate sequence of erection and removal of formwork/falsework.

.9 Submit manufacturer's product data sheets including materials, allowable loading, installation, application and maintenance instructions for the applicable items listed below:

.1 Lumber for formwork and falsework.

.2 Plywood for formwork and falsework.

.3 Form release agent.

.4 Form ties.

.5 Proprietary scaffolding.

.10 Submit WHMIS SDS - Safety Data Sheets in accordance with Section 01 35 43 – ENVIRONMENTAL PROCEDURES and Section 01 35 46 – ARCHEOLOGICAL AND CULTURAL PROCEDURES.

.3 Qualifications and certifications as required by specifications.

.4 At least four (4) weeks prior to beginning Work, submit to the Departmental Representative the procedure and forming materials intended to be used to create the required rounded edges in concrete, for approval by the Departmental Representative. Provide a sample concrete radius using the submitted procedure and materials.

1.4 PRICE AND PAYMENT PROCEDURES

.1 Payments related to this Section shall be as set out in Section 01 22 01 – MEASUREMENT AND PAYMENT.

1.5 DESIGN REQUIREMENTS

.1 Design formwork and falsework in accordance with CSA S269.1, CSA A23.1/A23.2, clause 6.4 and Section

03 35 00 CONRETE FINSHING. Formwork, to provide specified finishes.

.2 Design formwork and falsework to carry dead loads and construction live loads.
.1 Formwork and falsework shall not transfer to existing structures loads that exceed those for which they were designed.

.3 When high range water reducer (superplasticizer) is used in concrete mix, design forms for full hydrostatic pressure.

.4 Make joints in forms watertight.

.5 For precast deck slabs, design formwork and falsework in accordance with CSA A23.4 and Section 03 35 00 CONRETE FINSHING.

1.6 REQUIREMENTS OF REGULATORY AGENCIES

.1 Conform to Federal, Provincial and Municipal codes relating to design and construction of formwork and falsework.

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 21 – CONSTRUCTION/DEMOLITION WASTE MANAGEMENT AND DISPOSAL, Section 01 35 43 – ENVIRONMENTAL PROCEDURES and Section 01 35 46 – ARCHEOLOGICAL AND CULTURAL PROCEDURES.
.1 Divert wood materials and plastic from landfill to a recycling facility.

.2 Use sealers and form release agents that are non-toxic, biodegradable and have zero or low VOCs.

1.8 QUALITY CONTROL

.1 Submit Certificates of Conformance, in conformance with Section 01 45 00 – QUALITY ASSURANCE, for all formwork and falsework for which Shop Drawings are submitted.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Formwork materials:

.1 For concrete without special architectural features, use wood and wood product formwork materials to CSA O121 and CSA O86.

.1 Plywood: high density overlay Douglas Fir to CSA O121 or Canadian Softwood Plywood to CSA O151, sanded, square edge, 19 mm thick.

.2 Rigid insulation board: to CAN/ULC-S701.

.2 Form ties: Use removable or snap-off metal ties, fixed or adjustable length, equipped with waterstop, free of devices leaving holes larger than 25 mm diameter or deeper than 50 mm in concrete surface.

.3 Form release agent: non-toxic, biodegradable, low VOC. Maximum VOC level to be 250g/L based on EPA test method 24 and biodegradability as descried by EPA as having a half-life of 28 days or less based on ASTM D5864.

.4 Form stripping agent: Use colourless mineral oil, non-toxic, biodegradable, low or no VOC, free of kerosene, with viscosity between 15 to 24 mm^2/s at 40 degrees C, flashpoint minimum 150 degrees C, open cup.

.5 Formwork 76 mm radius edging details shall be made of steel.

.6 Falsework materials: to CSA S269.1.

.7 Waterstops: in accordance with Section 03 30 00 - CAST-IN-PLACE AND PRECAST CONCRETE

2.2 SMOOTH-FORM FINISH

.1 The form facing material shall produce smooth, hard, uniform texture on concrete.

.2 Material with raised grain, torn surfaces, worn edges, patches, dents, or other defects that will impair the texture of the concrete surface shall not be used.

.3 Tie holes and defects shall be patched to the satisfaction of the Departmental Representative, as per SECTION 03 35 00 – CONCRETE FINISHING, using a cement-based repair mortar, in strict compliance with manufacturer’s instructions.

.4 Smooth-form finish shall be used for all formed surfaces, unless otherwise noted.

PART 3 - EXECUTION

3.1 FABRICATION AND ERECTION

.1 Verify lines, levels and centres before proceeding with formwork/falsework and ensure dimensions agree with Drawings.
.1 Tolerances for formed surfaces: Refer to Section 03 30 00 - CAST-IN PLACE AND PRECAST CONCRETE.

.2 Remove loose rock and debris from forms before placing concrete.

.3 Fabricate and erect falsework in accordance with CSA S269.1.

.4 Formwork shall be solidly fixed in place and resist the loads to which it is exposed while maintaining its shape and alignment until concrete has cured.

.5 Do not place shores and mud sills on frozen ground.

.6 Provide site drainage to prevent water from flowing through forms.

.7 Fabricate and erect formwork in accordance with CAN/CSA S269.1 to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CSA A23.1/A23.2.

.8 Align form joints and make watertight.
.1 Keep form joints to minimum.

.9 Locate horizontal form joints for all concrete elements as indicated on Drawings, or as approved by the Departmental Representative.

.10 Unless otherwise noted, all exposed vertical, upper horizontal and upper inclined, including in-water, concrete edges shall be rounded with a 75 mm radius.
.1 Submit to the Departmental Representative the procedure and forming materials intended to be used to create the required rounded edges in concrete, for approval by the Departmental Representative. Also produce a sample concrete radius using the submitted procedure and materials. Only methods and materials approved by the Departmental Representative shall be used on site to produce the required rounded edges in concrete.

.11 For all remaining non visible concrete edges that are submerged under water or backfilled: use 25 mm chamfer strips on external corners and/or 25 mm fillets at

interior corners, joints, unless specified otherwise on Drawings.

.12 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated.

.13 Install waterstops within the formwork as required on the Drawings and in strict compliance with manufacturer's instructions and Section 03 30 00 – CAST IN PLACE AND PRECAST CONCRETE.

.14 Build in anchors, sleeves, and other inserts required to accommodate Work specified in other sections.
- .1 Ensure that anchors and inserts will not protrude beyond surfaces designated to receive applied finishes.

.15 Clean formwork in accordance with CSA A23.1/A23.2, before placing concrete.

3.2 INSPECTION ACCESS

.1 The Contractor shall not close forms prior to reinforcing bar inspection and acceptance by the Departmental Representative.

.2 Provide at least 24 hours' notice for inspection.

3.3 FORM RELEASE AGENT

.1 Surface preparation:
- .1 Protect adjacent surfaces not designated to receive concrete form release.
- .2 Clean and prepare surfaces to receive form release agent in accordance with manufacturer's instructions.
- .3 Clean form surfaces thoroughly prior to application.
- .4 Remove all rust, scale and/or previously used form release agents from the forms in accordance with good concrete practices.
- .5 When using wooden forms, form release agent shall be applied and re-applied until complete saturation has been achieved prior to first use.

.2 Application:
- .1 Apply concrete form release agent in accordance with manufacturer's instructions.

3.4 REMOVAL AND RESHORING

.1 Leave formwork in place for following minimum periods of time after placing concrete.

.1 3 days for apron, sills, footings, piers, abutment walls, gravity dams and retaining walls.

.2 21 days for slabs, decks and other structural members, or 7 days when replaced immediately with adequate shoring to standard specified for falsework.

.2 Remove formwork when concrete has reached 80% of its design strength or minimum period noted above, whichever comes later, and replace immediately with adequate reshoring.

.3 Provide all necessary reshoring of members where early removal of forms may be required or where members may be subjected to additional loads during construction as required.

.4 Space reshoring in each principal direction at not more than 3000 mm apart.

.5 Maintain shoring and reshoring for a minimum total of 21 days.

.6 Re-use formwork and falsework subject to requirements of CSA A23.1/A23.2 and written approval of Departmental Representative.

END OF SECTION

PART 1 - GENERAL

1.1 DESCRIPTION

.1 This Section specifies the requirements for concrete reinforcement and dowels, as shown on the Drawings and as specified herein, including drilling holes in base material, supplying and grouting dowels of size, length and shape shown on the Drawings.

1.2 RELATED REQUIREMENTS

.1 Section 03 10 00 - CONCRETE FORMING AND ACCESSORIES

.2 Section 03 30 00 - CAST-IN-PLACE AND PRECAST CONCRETE

1.3 PRICE AND PAYMENT PROCEDURES

.1 Payments related to this Section shall be as set out in Section 01 22 01 – MEASUREMENT AND PAYMENT.

1.4 REFERENCES

.1 ASTM International
  .1 ASTM A1064/A1064M-18, Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.

.2 CSA International
  .1 CSA A23.1:19/A23.2:19, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
  .2 CSA A23.3-19, Design of Concrete Structures.
  .3 CSA A23.4-16, Precast Concrete - Materials and Construction.
  .4 CSA G30.3-M1983 (R1998), Cold Drawn Steel Wire for Concrete Reinforcement.
  .5 CSA G30.18-09 (R2019), Carbon Steel Bars for Concrete Reinforcement.
  .6 CSA G40.20/G40.21-13 (R2018), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
  .7 CSA W186-M1990 (R2016), Welding of Reinforcing Bars in Reinforced Concrete Construction.

.3 Reinforcing Steel Institute of Canada (RSIC)
  .1 RSIC-2013, Reinforcing Steel Manual of Standard Practice.

.4 American Concrete Institute (ACI)
  .1 SP-66-04, ACI Detailing Manual.

.1 ACI 315-17, Details and Detailing of Concrete Reinforcement.
.2 ACI 315R-18, Manual of Engineering and Placing Drawings for Reinforced Concrete Structures.

.2 ACI 350R-06, Code Requirements for Environmental Engineering Concrete Structures.

.3 ACI 350.1-10, Specification for Tightness Testing of Environmental Engineering Concrete Containment Structures.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

.1 Four (4) weeks prior to beginning of Work, submit in accordance with Section 01 33 00 - SUBMITTAL PROCEDURES.

.2 Shop Drawings:

.1 Prepare reinforcement drawings in accordance with RSIC Manual of Standard Practice.

.2 Reinforcement shop drawings shall include a written statement that all development, splicing and bending details conform to Canadian Standards Association (CSA) standards. Indicate placing of reinforcement and include:

.1 Bar bending details.
.2 Bar lists.
.3 Quantities of reinforcement.
.4 Sizes, spacing, locations of reinforcement and mechanical splices, if approved by Departmental Representative, with identifying code marks to permit correct placement without reference to structural drawings.
.5 Indicate sizes, spacing and locations of chairs, spacers and hangers.

.3 Indicate reinforcing bars that form part of an individual concrete placement and reinforcing bars that extend into adjacent placements.

.4 For each reinforcing bar placement shop drawing, submit a separate bar list and bending schedule showing size, shape, dimensions and number of bars required for each bar type.

.5 Identify reinforcing bars in the bar list and bending schedule with a separate bar mark that corresponds to bar marks shown on reinforcing bar placement drawings.

.6 Detail lap lengths and bar development lengths to CSA A23.3, unless otherwise indicated.

.1 Provide Class B tension lap splice unless otherwise indicated.

.7 Detail placement of reinforcement where special conditions occur.

.8 Shop Drawings must bear certificate of conformance signed by the QVE.

.9 Shop drawings will be reviewed by the Departmental Representative for bar sizes, locations, and spacing. Rebar placement must follow shop drawings showing documented review and acceptance by the Departmental Representative.

.3 Qualifications, source of materials, test reports and certifications as required by specifications.

1.6 QUALITY ASSURANCE

.1 Submit in accordance with Section 01 45 00 – QUALITY ASSURANCE AND QUALITY CONTROL and as described in PART 2 - SOURCE QUALITY CONTROL.

.1 Mill Test Report: provide the Departmental Representative with certified copy of mill test report of reinforcing steel.

.2 Submit in writing to the Departmental Representative the proposed source of reinforcement material to be supplied.

1.7 DELIVERY STORAGE AND HANDLING

.1 Refer to Section 01 61 00 - COMMON PRODUCT REQUIREMENTS.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Substitute different size bars only if permitted in writing by the Departmental Representative.

.2 Reinforcing steel and dowels: carbon steel, grade 400W, deformed bars to CSA G30.18, unless indicated otherwise.

.3 Cold-drawn steel wire ties: to ASTM A1064/A1064M.

.4 Chairs, bolsters, bar supports, spacers: to CSA A23.1/A23.2.

.1 Select hardware that will not be visible in finished surface of concrete.

.5 Bar supports and spacers:

.1 Adequate for accurate placing and as required for construction loads.

.2 Provide non-conductive bar supports in contact with exposed surfaces that have geometry and

bond characteristics that prevent moisture movement from the surface to the reinforcement.

.3 In walls and slabs exposed to view after form removal: use small concrete blocks made up of same color as concrete being placed and having a minimum compressive resistance of 35 MPa.

.6 Mechanical splices: subject to approval of the Departmental Representative.

.7 Cementitious Grout for Dowels:

.1 Proportion shrinkage compensating grout mix to comply with the following requirements:

.1 28 days compressive strength: 40 MPa.

.2 Maximum water/cement ratio: 0.4.

.3 Net shrinkage at 28 days: maximum 0 %.

.4 Portland cement type GU.

.5 Use admixtures, including superplasticizers, as required.

2.2 FABRICATION

.1 Fabricate reinforcing steel in accordance with CSA A23.1/A23.2 and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.

.2 Obtain the Departmental Representative's written approval for locations of reinforcement splices other than those shown on placing drawings.

.3 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.

2.3 SOURCE QUALITY CONTROL

.1 Inform the Departmental Representative of proposed source of material to be supplied.

.2 Provide the Departmental Representative with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis.

PART 3 - EXECUTION

3.1 FIELD BENDING

.1 Do not field bend or field weld reinforcement except where indicated or authorized by the Departmental Representative.

.2 When field bending is authorized, bend without heat, applying slow and steady pressure.

.3 Replace bars which develop cracks or splits.

3.2 PLACING REINFORCEMENT

.1 Place reinforcing steel as indicated on Drawings and in accordance with CSA A23.1/A23.2 and CSA A23.4, as applicable.

.2 Do not field cut reinforcement without authorisation from the Contractor's QVE and review by the Departmental Representative.

.3 Unless otherwise noted on the drawings, clear concrete cover to reinforcement is:
- .1 50 mm for precast deck slabs;
- .2 100 mm for concrete exposed to water flow;
- .3 75 mm for all other concrete elements.

.4 Tolerances for placing of reinforcement:
- .1 Clear concrete cover to reinforcement: ±10 mm.
- .2 Spacing of reinforcement: ±25 mm.

.5 Prior to placing concrete, obtain Departmental Representative's approval of reinforcing material and placement.

.6 Ensure cover to reinforcement is maintained during concrete pour.

.7 Splicing:
- .1 Use Class B tension lap splices, unless otherwise shown on Drawings or authorized in writing by Departmental Representative.
- .2 Stagger splices in adjacent bars.

3.3 DOWEL INSTALLATION

.1 Cementitious Grout:
- .1 Drill holes at least 25 mm larger than the bar diameter. Clean thoroughly by air or water jet.
- .2 Install bars with grout and de-air tubes securely attached.
- .3 Grout the drill hole opening.
- .4 Pump grout through grout tube until continuous flow of grout is coming out of the de-air tube.
- .5 Tolerance for dowel placement: ±50 mm.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 03 10 00 - CONCRETE FORMING AND ACCESSORIES.

.2 Section 03 20 00 - CONCRETE REINFORCING.

.3 Section 03 35 00 - CONCRETE FINISHING

1.2 PRICE AND PAYEMENT PROCEDURES

.1 Payments related to this Section shall be as set out in Section 01 22 01 – MEASUREMENT AND PAYMENT.

.2 All labour, equipment and materials for cast-in- place and precast concrete including incidentals, complete as specified, shall be included in their respective applicable price for concrete works.

.3 No deductions will be made for volume of concrete displaced by reinforcing steel.

.4 Include in the price of concrete the heating or cooling of water and aggregates, and the provision of hot or cold weather protection including provision for pre-heating of existing substrate.

.5 Surface preparation to existing concrete will not be measured separately. Payment for work shall be as set out in Section 01 22 01 – MEASUREMENT AND PAYMENT and shall be included in the applicable item of work for Structure Demolition.

.6 Include in the price of concrete the installation of all items embedded therein, including but not limited to waterstops and embedded steel.

.7 Include in the prices of concrete the supply and installation of joint filler, bond breaker, bonding agent and joint sealer.

.8 Include in the price of concrete work described in Section 03 10 00 – CONCRETE FORMING and 03 20 00 – CONCRETE REINFORCING.

.9 Supply and installation of anchor bolts, nuts and washers and bolt grouting will not be measured but considered incidental to work.

.10 Include in the price of concrete any concrete for foundation preparation of the receiving surface including dental concrete at bedrock surfaces and mud slab at existing soils. Payment for additional concrete due to additional/unexpected excavation shall be as relevant provisional item defined in the unit price table.

.11 All Other work, necessary to the completion of work of this section, will not be measured separately for payment and will be considered incidental to the work.

1.3 REFERENCES

.1 Abbreviations and Acronyms:
- .1 Portland Cement: hydraulic cement or blended hydraulic cement (XXb - where b denotes blended).
- .2 Type GU or GUb - General use hydraulic cement.
- .3 Type LH or LHb - Low heat of hydration hydraulic cement.

.2 ASTM International
- .1 ASTM C157/C157M – 17, Standard Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete
- .2 ASTM C260/C260M - 10(2016), Standard Specification for Air-Entraining Admixtures for Concrete.
- .3 ASTM C309 - 19, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
- .4 ASTM C494/C494M - 17, Standard Specification for Chemical Admixtures for Concrete.
- .5 ASTM C881/C881M – 15, Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
- .6 ASTM C882/C882M – 13a, Standard Test Method for Bond Strength of Epoxy-Resin Systems Used With Concrete By Slant Shear.
- .7 ASTM C920 – 18, Standard Specification for Elastomeric Joint Sealants.
- .8 ASTM C1017/C1017M - 13(2015), Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
- .9 ASTM D412/D412M - 16, Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension.
- .10 ASTM D545 – 19, Standard Test Methods for Preformed Expansion Joint Fillers for Concrete Construction (Nonextruding and Resilient Types).
- .11 ASTM D570/D570M - 98(2018), Standard Test Method for Water Absorption of Plastics.
- .12 ASTM D624 - 00 (2020), Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomer.

.13 ASTM D638 - 14, Standard Test Method for Tensile Properties of Plastics
.14 ASTM D695 – 15, Standard Test Method for Compressive Properties of Rigid Plastics.
.15 ASTM D746 - 14, Standard Test Method for Brittleness of Plastics and Elastomers by Impact
.16 ASTM D1056 – 14, Standard Specification for Flexible Cellular Materials-Sponge or Expanded Rubber.
.17 ASTM D1752 – 18, Standard Specification for Preformed Sponge Rubber, Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.
.18 ASTM D2240 – 15e1, Standard Test Method for Rubber Property-Durometer Hardness.
.19 ASTM D3575 – 14, Standard Test Methods for Flexible Cellular Materials Made From Olefin Polymers.
.20 ASTM F593 – 17, Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
.21 ASTM F1554 – 18, Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
.22 ASTM G154 – 16, Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials.

.3 CSA International
.1 CSA A23.1:19/A23.2:19, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
.2 CSA A23.4-16, Precast Concrete - Materials and Construction.
.3 CSA A283-19, Qualification Code for Concrete Testing Laboratories.
.4 CSA A3000-18, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
.5 CSA S6-19, Canadian Highway Bridge Design Code

.4 American Concrete Institute (ACI)
.1 ACI 306R-16, Guide to Cold Weather Concreting.

.5 Conform to all the latest editions of reference standards. The standards provide the **minimum** requirements to be met by the Contractor and concrete supplier. Additional concrete requirements have been established in this specification. The most stringent requirement shall be followed and no deviation from the requirements will be considered at the time of construction.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Pre-installation Meetings: in accordance with Section 01 31 19 - PROJECT MEETINGS.
  .1 Convene pre-installation meeting five (5) working days prior to beginning concrete works. Ensure Departmental Representative, specialty Sub-contractors (finishing, forming, etc.) and other key personnel attend.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - SUBMITTAL PROCEDURES.

.2 At least four (4) weeks prior to beginning concrete Work, provide the Departmental Representative with submittals of the following:
  .1 Certification of cast-in-place concrete plant to CSA A23.1/A23.2.
  .2 Certification of precast concrete plant to CSA A23.4.
  .3 Concrete placement plan, including Quality Control Plan and Thermal Control Plan.
  .4 Precast Concrete installation plan, including procedures for fabrication, maintenance, protection, transportation, reception, storing, lifting and installation of the precast deck slabs, to CSA A23.4 and to manufacturer’s instructions.
    .1 Precast Concrete installation plan shall show the location, the reference number and orientation of each precast panel as well as all necessary placement, installation instructions, specific seating details and closure sealing details required to complete all the installation.
  .5 Shop Drawings for fabrication of precast deck slabs in accordance with CSA A23.4, including:
    .1 Details of members, reinforcement and their connections.
    .2 Finishing schedules.
    .3 Methods of handling and erection.
    .4 Openings, sleeves, inserts and related reinforcement.
    .5 Details of expansion joints.
    .6 Details of each individual panel with the corresponding reference marking associated to the Precast Concrete installation plan.
  .6 Shop drawings to be stamped and signed by qualified professional engineer licensed in the Province of Ontario, Canada.

.7 Mix designs for all concrete, including technical data on admixtures, mix proportions, and aggregate sources.
.8 Manufacturer's instructions, printed product literature and data sheets for joint seals, including product characteristics, performance criteria, physical size, finish, colour and limitations.
.9 Technical Data Sheets for all anchor bolts to be used during work. Indicate materials, finishes, connections and accessories to be used during work.
.10 Technical Data Sheets for all Waterstops and Waterproofing bands, to be used during work. Indicate materials, finishes, connections and accessories to be used during work.

.3 At least four (4) weeks prior to beginning concrete Work, provide the Departmental Representative with submittals of certifications by the QVE that the following materials will meet the specified requirements and are compatible:
.1 Joint seals.
.2 Waterstop.
.3 Waterproofing band.
.4 Supplementary cementing material.
.5 Each type of blended hydraulic cement.
.6 Each admixture.
.7 Each fine and coarse aggregate.
.8 Water.
.9 AAR test reports to CSA A23.2 and certification that cement has an equivalent alkali content no greater than 0.6%.

.4 At least four (4) weeks prior to beginning concrete Work, provide Certification that mix proportions and materials are chosen to prevent alkali aggregate reactivity and will produce concrete quality, yield and strength as specified and in compliance with CSA A 23.1
.1 Provide testing results for review by the Departmental Representative and do not proceed without written approval when deviations from mix design or parameters are found.

.5 At least four (4) weeks prior to beginning concrete Work, submit curing method to Contractor’s QVE for approval and to Departmental Representative for review. Do not fabricate precast deck slabs or place cast-in-place concrete until mix designs and curing method have been reviewed and accepted by the Departmental Representative.

.6 Concrete pours: submit accurate records of poured concrete items indicating date and location of pour, quality, air temperature and test samples taken.

.7 Before unloading at Site, have concrete producer submit to the Departmental Representative a delivery ticket (with each batch of concrete) on which is printed, stamped or written the following information:
- .1 Name and location of batching plant.
- .2 Date and serial number of ticket.
- .3 Name of Contractor.
- .4 Specific designation of job (name and location).
- .5 Approved mix code, specified strength, and specific class or designation of concrete indicated in Concrete Mixes article specified.
- .6 Amount of concrete in cubic meters.
- .7 Truck number, cumulative total, and/or load number.
- .8 Time loaded or time of first mixing of cement and water/aggregate.
- .9 Addition of water on site subject to approval by Departmental Representative. Show amount and have this information initialed by the Departmental Representative.

.8 Include the following information, which is to be registered by producer's representative on at least two copies of the delivery ticket, after discharge has been completed:
- .1 Time that load arrived on Site.
- .2 Time that discharge of load was started.
- .3 Time that discharge of load was completed.
- .4 Type and amount of admixtures, if added on Site.
- .5 Location of placed concrete and any issues encountered.
- .6 Volume of concrete returned.

.9 Maintain accurate records of precast and cast-in-place concrete elements. Include in records the following information:
- .1 Date of placing concrete element.
- .2 Location of concrete element.
- .3 Specified strength of concrete.
- .4 Air and form temperature when concrete was placed.
- .5 Temperature of concrete when placed in the form.
- .6 Test samples taken and results of test samples.

.10 Submit additional information designated by the Departmental Representative and required to verify compliance with Specifications upon request.

.11 Provide two copies of WHMIS SDS in accordance with Section 01 35 29.06 - HEALTH AND SAFETY REQUIREMENTS,

Section 01 35 43 – ARCHEOLOGICAL, CULTURAL AND ENVIRONMENTAL PROCEDURES.

1.6 QUALITY ASSURANCE

.1 Quality Assurance: in accordance with Section 01 45 00 - QUALITY ASSURANCE AND QUALITY CONTROL.

.2 Submit to the Contractor's QVE for approval and to the Departmental Representative for review, minimum four (4) weeks prior to starting concrete work, a valid and recognized certificate from plant(s) delivering concrete or precast concrete.
  .1 Provide test data and certification by qualified independent inspection and testing laboratory that materials and mix designs used in concrete mixture will meet the specified requirements.
  .2 Provide Manufacturer's qualifications:
    .1 Ready mix concrete supplier: Member in good standing of Ready Mix Concrete Association of Ontario (RMCAO). Batching plant facilities are required to maintain RMCAO Special Seal of Quality.
    .2 Batching and delivery facilities: capable of producing minimum of 50 m^3/h of concrete, conforming to requirements of CSA A23.1/A23.2.
    .3 Precast concrete elements: manufacturing plant certified in appropriate category, according to CSA A23.4.

.3 Minimum four (4) weeks prior to starting concrete work, provide Quality Control Plan outlining proposed quality control procedures approved by the Contractor's QVE for review by the Departmental Representative on following items:
  .1 Precast concrete.
  .2 Falsework erection.
  .3 Temperature control.
  .4 Hot weather concrete.
  .5 Cold weather concrete.
  .6 Cold weather protection.
  .7 Curing.
  .8 Uniform and consistent concrete finishing.
  .9 Formwork removal.
  .10 Joints.
  .11 Reinforcing.
  .12 Waterstops and Waterproofing Bands.
  .13 Embedded parts.
  .14 Testing of fresh concrete prior to placement.
  .15 Maintaining an environment for concrete curing.

.4 Quality Control Plan to include procedures for verifying compliance that concrete in place meets

performance requirements of concrete as established in PART 2 - PRODUCTS of this Section.

.1 Provide data and test results by qualified independent inspection and testing laboratory showing compliance that concrete in place meets performance requirements of concrete, as per the Quality Control Plan.

.2 Include a temperature control plan, describing methods for monitoring and controlling concrete temperature and temperature differentials before, during and after placement for:

.1 Concrete components of thickness equal to or greater than 1000 mm.

.2 Concrete components subject to cold weather concreting.

.5 Temperature control plan for monitoring heat-of hydration through testing results, insulating and curing periods, shrinkage crack prevention and thermocouples to include, as a minimum:

.1 List of concrete elements for which the plan applies.

.2 Temperature monitoring system, including the location and depth, number of thermocouples and frequencies of recordings to be used in each placement.

.3 Method of ensuring concrete temperature and temperature difference are maintained for the duration of the protection period.

.4 Any alterations to work schedule, production, delivery schedule, and time for placement for temperature control purposes.

.5 Any other specific measures to be taken.

.6 Warranty for precast decks slabs: Contractor warrants that precast element will not spall or show visible evidence of corrosion of embedded steel and cracking, except for normal hairline shrinkage cracks, for 5 years.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Delivery, storage and handling of precast concrete to be in accordance with CSA A23.4 and Manufacturer’s instructions.

.1 Protect unit corners from contacting earth to prevent from staining.

.2 Delivery, storage and handling of cast-in-place concrete to be in accordance with CSA A23.1/A23.2.

.3 Concrete hauling time: delivered to site of Work and discharged within 120 minutes maximum after batching.

.4 Notify immediately the Departmental Representative of any deliveries that may exceed the maximum allowable time of 120 minutes for concrete to be delivered to site of Work and discharged after batching.

.5 Ensure continuous concrete delivery from plant for each pour meets CSA A23.1/A23.2.

1.8 DESIGN CRITERIA

.1 Design to be made by qualified professional engineer licensed in the Province of Ontario, Canada.

.2 Contractor shall design the deck as per the latest Canadian Highway Bridge Design Code, CSA S6.

.3 Loading shall be as indicated in the Drawings.

.4 Contractor shall design the precast-prestressed slabs to incorporate lateral post tensioned rod system.
.1 Location and size shall be determined as required by design carried out by the contractor.
.2 Lateral post tensioned rod system not to interfere with Date Stamp.

.5 Contractor to identify dimensions of precast slab panels as well as location of all required embedment.

.6 Contractor to plan precast slab to suit embedment locations.

.7 Design of precast slab to allow drilling of post-installed anchors without interfering with reinforcement, along 120 mm strips on either side of rail axes and along 120 mm strips located between 90 mm and 210 mm from upstream and downstream edges of the deck.

.8 Bearing devices, including concrete pedestal and dowel sizes shown on Drawings are indicative. Contractor to Design of Bearing Devices for the design loads.
.1 Design shall conform to the Canadian Highway Bridge Design Code, CSA S6.

.9 Bearing Device centerline locations shown on Drawings are indicative and can be coordinated with the Departmental Representative to suit design requirements.

1.9 WASTE MANAGEMENT AND DISPOSAL

.1 Refer to Section 01 35 43 – ARCHEOLOGICAL, CULTURAL AND ENVIRONMENTAL PROCEDURES and Section 01 74 21 – CONSTRUCTION/DEMOLITION WASTE MANAGEMENT AND DISPOSAL.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Portland Cement: to CSA A3001, Type GU and Type LH.

.2 Blended hydraulic cement: to CSA A3001, Type GUb and Type LHb.

.3 Supplementary cementing materials: with minimum 6 to 8% silica fume, by mass of total cementitious materials to CSA A3001.

.4 Cementitious hydraulic slag ranging between 20% to 30%, by mass of total cementitious materials: to CSA A23.1/A23.2.

.5 Pozzolanic mineral admixtures: to CSA A3001.

.6 Water: to CSA A23.1/A23.2.

.7 Aggregates: to CSA A23.1/A23.2.
.1 Hard, dense, well graded aggregates of normal mass-density, approved by the Departmental Representative both as to quality and source.

.8 Admixtures:
.1 Air entraining admixture: to ASTM C260/C260M.
.2 Chemical admixture: to ASTM C494/C494M and ASTM C1017/C1017M. Departmental Representative to approve accelerating or set retarding admixtures during normal, cold and hot weather placing.
.3 Shrinkage-reducing admixture (SRA) to produce low shrinkage concrete: to ASTM C494/C494M, Type S.
.4 Superplasticizing admixture to ASTM C1017/C1017M.

.9 Cementitious Grout for Dowels: as per Section 03 20 00 – CONCRETE REINFORCING.

.10 Shrinkage compensating grout: premixed compound consisting of non-metallic aggregate, Portland cement, water reducing and plasticizing agents to CSA A23.1/A23.2.
.1 Minimum compressive strength: 40 MPa at 28 days.
.2 Net shrinkage at 28 days: maximum 0 %.

.3 Grouted joints of Deck to match Deck finish.

.11 Non-premixed dry pack grout: composition of non-metallic aggregate Portland cement with sufficient water for mixture to retain its shape when made into ball by hand and capable of developing compressive strength of 50 MPa at 28 days.

.12 Cement Repair Mortar: Parge demolished concrete surfaces exposed to flow with non-sag Polymer-modified Portland cement mortar appropriate for use in layers of thickness ranging from 6 mm to 38 mm.
.1 Minimum compressive strength: 45 MPa at 28 days.
.2 Minimum bond strength: 15 MPa at 28 days

.13 Waterstops: ribbed flexible PVC extruded from an elastomeric plastic material of which the basic resin is prime virgin polyvinyl chloride. The PVC compound shall not contain any scrapped or reclaimed material or pigment whatsoever. Sizes as indicated with pre-welded corner and intersecting pieces, no less than 225 mm wide and 9.5 mm thick, effective under the hydrostatic load of the reservoir
.1 Tensile strength: to ASTM D638, minimum 13 MPa.
.2 Ultimate elongation: to ASTM D638, minimum 300%.
.3 Tear resistance: to ASTM D624, minimum 50 kN/m.
.4 Water absorption: to ASTM D570, maximum 0.15%.
.5 Low temperature brittleness: to ASTM D746, No cracking, brittleness or splitting at -37°C (-35°F).
.6 Stiffness in flexure: to ASTM D747, minimum 4.8 MPa.
.7 Specific gravity: to ASTM D792, 1.4.
.8 Hardness Shore A15: to ASTM D2240 79±3.

.14 Waterproofing band: for construction joints between existing and new concrete.
.1 Supply Waterproofing bands of dimensions corresponding approximately to those shown on Drawings, and effective under the maximum hydrostatic load of the reservoir.
.2 Waterproofing band to be composed of a plasticised synthetic rubber core of rectangular section, coated with fine crushed gravel on three of its four sides, as specified on Drawings.
.3 The core of the band must be non-putrescible, chemically neutral and non-sensitive to the alkalinity of the concrete.
.4 The fine crushed gravel coating the core of the band must be of variable grain diameters between 4 and 8 mm and must allow for a complete liaison with the fresh concrete.
.5 Waterproofing bands must have a viscoelastic lengthening capacity of at least 200% and an

elastic modulus varying from 0.12 MPa to 4.4 MPa between -20°C and 40°C.

.15 Weep hole tubes and sleeves: galvanized steel.

.16 Threaded anchor bolts and adhesive anchors:
- .1 Provide anchors complete with all necessary parts as specified by manufacturer, and additional accessories indicated on drawings or described in specifications.
- .2 Unless otherwise noted on the Drawings, all threaded anchor rods for the new structures to be stainless steel, to ASTM F593, CW.
- .3 Unless otherwise noted on the Drawings, all anchors for use on the existing dam to be carbon steel, to ASTM F1554, Grade 105.

.17 Pre-formed Joint Seal:
- .1 Impermeable pre-formed closed cell low density polyethylene foam joint seal bonded against concrete substrate with epoxy bonding agent. Foam material to meet ASTM D1056 Type 2, Class B, Grade 2 as well as the following physical criteria:
- .2 Compression set to ASTM D3575 Suffix B: 50 %
  - .1 2hr Recovery 10% Set.
- .3 Elongation: to ASTM D3575 Suffix T: 185% - 275%.
- .4 Density: to ASTM D3575 Suffix W, 2.7 - 3.4 lbs/ft^3.
- .5 Water Absorption: to ASTM D3575 Suffix L, average 0.02 lbs/ft^2.
- .6 Weatherability: to ASTM G154, 3000 hrs: no chalking, flaking, blistering, checking & cracking
- .7 Tensile: to ASTM D3575 Suffix T: 92 - 140 psi.
- .8 Recovery: to ASTM D545, 98.9%.
- .9 Tear Resistance: to ASTM D624, 1.79 - 3.57 kg/cm (10 -20 lbs/in).
- .10 Thermal Stability: to ASTM D3575 Suffix S, maximum 5.9%.
- .11 Movement capability: design to handle 50% in compression, 25% in tension and 50% total horizontal or vertical shear movement.
- .12 Service Temperature: design exterior expansion joint cover assemblies to accommodate joint movements within service temperature range of -70 degrees C to 70 degrees C.
  - .1 Bonding agent for joint seal: 100% solids two component, moisture insensitive modified epoxy adhesive, conforming to ASTM C881/C881M Type II Grade 2 Class A and the after cure properties requirements listed below:
- .13 Colour: Grey.

.14 Compressive Strength: to ASTM D695, 7000 psi (48.26 MPa).
.15 Tensile Strength: to ASTM D638, 3500 psi (24.13 MPa).
.16 Elongation at Break: to ASTM D638, 3-5%.
.17 Shore D Hardness: ASTM D2240, 85±5.
.18 Water Absorption: to ASTM D570, 0.25%.
.19 Bond Strength: to ASTM C882, minimum 430 psi.
.20 Lap shear: minimum 2000 psi.

.18 Polyurethane Joint Sealant:
.1 Sealant to conform to ASTM C920 Type M, Grade NS, Class 50 polyurethane elastomer self-leveling three (3) components. Color to match Deck.

.19 Joint Filler:
.1 Joint Filler to conform to ASTM D1752, Type II and be made from clean, granulated cork bonded with a phenolic resin.

.20 Precast Deck Slabs:
.1 Manufacture units in accordance with CSA A23.4.
.2 Mark each precast unit to correspond to identification mark on shop drawings for location with date cast on part of unit not be exposed.
.3 Provide hardware suitable for handling elements.
.4 Provide sample and sample number of each finish to be used to Departmental Representative, for review.
.5 Elastomeric bearings shall conform to ASTM D2240 with a hardness shore a 55±5.

.21 Curing compounds:
.1 ASTM C309, Type 2.
.2 Combination curing and sealing compound: ASTM C309; Clear, non-yellowing compound.

.22 Wet curing materials:
.1 Non staining waterproof curing paper, burlap or canvas coverings.

2.2 CONCRETE MIXES

.1 Performance: to CSA A23.1/A23.2, and as described herein.
.1 Ensure precast concrete and cast-in-place concrete supplier meet performance criteria as established below and provide verification of compliance as per the Contractor’s approved Quality Control Plan.
.2 Provide concrete mix to meet following plastic state requirements:

.1 Workability: free of surface blemishes, loss of mortar, colour variations and segregation.

.3 Provide specific concrete mix for each of the dam components as outlined in the table below.

Concrete Mixes
Mix 1 - Mass concrete pours for elements of thickness equal to or greater than 1000 mm
Mix 2 - Concrete pours for elements of thickness less than 1000 mm
Mix 3 - Secondary concrete
Mix 4 – Self-compacting concrete
Mix 5 - Filler concrete, Dental concrete, Mud-slab concrete

.4 Proportion Mix 1 as normal density concrete in accordance with CSA A23.1, Alternative 1 to give the following quality for mass concrete pours of thickness equal to or greater than 1000 mm:

.1 Cement: Type LH or LHb
.2 Minimum compressive strength at 56 days: 30 MPa.
.3 Maximum water/cementing materials ratio: 0.45.
.4 Class of exposure: F-1.
.5 Nominal size of coarse aggregate: 40 mm.
.6 Slump at time and point of discharge: 50 to 100 mm.
.7 Air content: 4 to 7%.
.8 Intended application of freshwater hydraulic structures.
.9 Shrinkage performance to comply with requirements for low shrinkage concrete, as described in CSA A23.1, clause 8.8.2.

.5 Proportion Mix 2 as normal density concrete in accordance with CSA A23.1, Alternative 1 to give following quality for concrete pours of thickness less than 1000 mm:

.1 Cement: Type GU or GUb.
.2 Minimum compressive strength at 28 days: 30 MPa.
.3 Maximum water/cementing materials ratio: 0.45.
.4 Class of exposure: F-1.
.5 Nominal size of coarse aggregate: 20 mm.

.6 Slump at time and point of discharge: 50 to 100 mm.
.7 Air content: 5 to 8%.
.8 Intended application of freshwater hydraulic structures.

.6 Proportion Mix 3 as normal density concrete in accordance with CSA A23.1/A23.2, Alternative 1 to give following quality for secondary concrete pours:
.1 Cement: Type GU or GUb.
.2 Minimum compressive strength at 28 days: 35 MPa.
.3 Maximum water/cementing materials ratio: 0.45.
.4 Class of exposure: F-1.
.5 Nominal size of coarse aggregate: 13 mm.
.6 Slump at time and point of discharge: 50 to 100 mm.
.7 Air content: 5 to 8%.
.8 Chemical admixtures: superplasticizing and shrinkage compensating admixtures to the approval of the Departmental Representative.
.9 Intended application of freshwater hydraulic structures
.10 Shrinkage performance to comply with requirements for low shrinkage concrete, as described in CSA A23.1/A23.2, clause 8.8.2.

.7 Proportion Mix 4 as normal density concrete in accordance with CSA A23.1/A23.2, Alternative 1 to give the following quality for resurfacing concrete:
.1 Cement: Type GU or GUb.
.2 Minimum compressive strength at 28 days: 35 MPa.
.3 Blast furnace slag: 20 to 30% of the total mass of cementitious materials.
.4 Chemical admixtures: shrinkage compensating admixture to ASTM C494, Type S
.5 Class of exposure: F-1.
.6 Nominal size of coarse aggregate: 2.5 mm to 10 mm.
.7 Slump flow at time and point of discharge: 650 ± 70 mm.
.8 Air content: 6 to 9%.
.9 Intended application of freshwater hydraulic structures.
.10 Shrinkage measured according to ASTM C157, limited to maximum of 0.065%.

.8 Proportion Mix 5 as normal density concrete in accordance with CSA A23.1/A23.2, Alternative 1 to give the following quality for filler concrete:
.1 Cement: Type GU or GUb.

.2 Minimum compressive strength at 28 days: 30 MPa.
.3 Maximum water/cementing materials ratio: 0.45.
.4 Class of exposure: F-1.
.5 Nominal size of coarse aggregate: 20 mm.
.6 Slump at time and point of discharge: 50 to 100 mm.
.7 Air content: 5 to 8%.
.8 Intended application of freshwater hydraulic structures.
.9 Provide quality management plan to ensure verification of concrete quality to specified performance.

.2 Other than air entraining admixtures, admixtures are not permitted without prior approval of the Departmental Representative. List all proposed admixtures design submission. Do not change or add admixtures to approved design mixes without Departmental Representative's approval.
.1 Departmental Representative may withdraw prior approval of admixture if conditions encountered during course of work indicate unsatisfactory performance.

2.3 EQUIPMENT

.1 Provide equipment suitable for safe handling of precast deck slabs and other prefabricated elements to be embedded in concrete.

.2 Equipment made of aluminum material not to come in contact with the plastic concrete.

.3 Placing Equipment:
.1 Consolidating Equipment: as per CSA A23.1/A23.2. External form vibrators are not permitted. Size and number of internal vibrators to be based on rate of concrete placement.
.2 Mixer for Bonding Agents: The mixer for bonding agent to be a stationary mixer, power driven, and capable of uniformly mixing the materials.

.4 Hand Finishing Equipment: Floats to be made of magnesium or wood. Magnesium bull floats to be commercially made.

.5 Straight Edges: Use two straight edges commercially made of metal, one 3 m and one 0.5 m long.

.6 Compressor – Air Blasting: The compressor for air blasting to have a minimum capacity of 3.5 m^3/minute. The compressed air to be free of oil or other

contaminants when tested in conformance with ASTM D 4285-83.

.7 Produce concrete at a batching plant. The use of mobile mixers is not permitted.
.1 Plant to be capable of producing tickets in accordance with CSA A23.1/A23.2.

PART 3 - EXECUTION

3.1 PREPARATION

.1 Obtain the Contractor's QVE's written approval and the review by the Departmental Representative before fabricating precast concrete or placing concrete.
.1 Provide 48 hours minimum notice prior to placing of concrete.

.2 Place concrete reinforcing in accordance with Section 03 20 00 - CONCRETE REINFORCING and CSA A23.4.

.3 Obtain approval of all embedded items in concrete prior to pouring of concrete.

.4 During concreting operations:
.1 Development of cold joints not allowed.
.2 Ensure concrete delivery and handling facilitates placing with minimum of re-handling, and without damage to existing structure or Work.

.5 Pumping of concrete is permitted only after review of equipment and mix by the Contractor's QVE and review by the Departmental Representative.

.6 Prepare surface on which concrete will be poured, in accordance with CSA A23.1/A23.2, chapter 7.
.1 Clean rock surfaces using appropriate methods such as compressed air, water jets, pneumatic hammer, scaling bars, hand shovels, brooms, or any other means to remove any mud, loose rock and other debris and make them ready to received concrete.
.2 Surfaces must be completely free of any foreign substance prior to concreting.
.3 Prior to pouring fresh concrete against hardened concrete, including secondary concrete for embedded parts and at construction joints, use water jet, air jet, sandblasting or vigorous brushing to roughen the hardened concrete surface to a minimum amplitude of 5 mm.
.4 Following the roughening, carefully clean and wash the hardened concrete surfaces which will come in contact with the fresh concrete until

the surfaces are completely clean and exempt of particles.

.5 Apply bonding agent as per manufacturer’s recommendations. Do not apply bonding agent unless concreting operations can take place within time lapse recommended by manufacturer.

.7 Ensure reinforcement and inserts are not disturbed during concrete placement.

.8 Prior to placing of concrete, obtain the Contractor’s QVE’s written approval and the Departmental Representative's review of proposed method for protection of concrete during placing and curing.

.9 Protect previous Work from staining.

.10 Clean and remove stains prior to application for concrete finishes.

.11 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.

.12 Do not place load upon new concrete until the authorisation is given by the Contractor’s QVE and reviewed by the Departmental Representative.

.13 For secondary concrete pours:

.1 Nuts and bolts shall be free of any dirt. Clean and oil anchor bolts to facilitate the adjustment of the embedded parts. Cary out oiling with precaution to not contaminate the concrete.

3.2 INSTALLATION/ APPLICATION

.1 Do precast concrete work in accordance with CSA A23.4.

.2 Do cast-in-place concrete work to CSA A23.1/A23.2.

.3 12mm deep recessed Date Stamp 150mm high, Helvetica Neue bold font, to be carved into the downstream face of the precast deck at Bay 1 (B1) and located at half the length of the precast deck away from the north abutment. Exact location and date to be coordinated with the Departmental Representative prior to casting.

.4 For second stage concrete pours:

.1 Place second stage concrete in such a way as to limit shrinkage of concrete and avoid displacement of embedded parts. The Departmental representative can at any time stop concreting if it is obvious that embedded parts have been

or are in danger or being displaced. The minimum delay before removal of the formworks is at least 3 days.

.2 Use of vibrator is required. Dimension of vibrator shall be 50 mm for the set of the embedded parts.

.5 Place concrete continuously from start to finish:

.1 At such rates as to permit satisfactory placing and consolidation - plan the work and use such methods and performance rates as not to allow cold joints and/or honeycombing.

.2 Development of unscheduled construction joints shall not be permitted.

.6 Maximum allowable concrete temperature at delivery is 25°C. Minimum allowable concrete temperature at delivery is 10°C.

.7 When ambient temperature rises above 27°C, place concrete to hot weather requirements of CSA A23.1.

.8 When ambient temperature falls below 5°C or is likely to fall below 5°C within 96 hours after concrete placement, place concrete to cold weather requirements of ACI 306R Cold Weather Concreting

.1 Provide insulated tarps and heaters as required to maintain temperatures within acceptable ranges.

.2 Heat surfaces that will receive newly placed concrete to at least 5°C, during at least 12 successive hours before pouring.

.3 Do not place concrete on frozen subgrade.

.4 Remove all snow and ice from formwork.

.9 Patch concrete after formwork removal to CSA 23.1 section 7.7.2.

.10 Sleeves and inserts:

.1 Do not permit penetrations, sleeves, ducts, pipes or other openings to pass through beams, except where indicated on drawings.

.2 Set sleeves, ties, pipe hangers and other inserts and openings as indicated or specified elsewhere.

.3 Sleeves and openings greater than 100 x 100 mm not indicated, must be reviewed by the Departmental Representative.

.4 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain written approval of modifications from the Departmental Representative before placing of concrete.

.5 Confirm locations and sizes of sleeves and openings shown on drawings.
.6 Set special inserts for strength testing as indicated and as required by non-destructive method of testing concrete.

.11 Anchor bolts:
.1 Drill holes in accordance with drawings and to manufacturers' recommendations.
.2 Take care to prevent damage to the concrete. To ensure as little damage as possible, use a rotary impact hammer drill, carbide-tipped masonry drill bits, or equipment otherwise specified by the manufacturer. All damage to concrete will be repaired by the Contractor.
.3 Do not drill holes in concrete until concrete has achieved full design strength.
.4 Protect anchor bolt holes from water accumulations, snow and ice build-ups.
.5 Install bolts in accordance with manufacturer’s specifications.
.6 Locate anchor bolts used in connection with bearing device with due regard to ambient temperature at time of erection. Drainage holes and weep holes:
.7 Form weep holes and drainage holes in accordance with Section 03 10 00 - CONCRETE FORMING AND ACCESSORIES. If wood forms are used, remove them after concrete has set.
.8 Install weep hole tubes and drains as indicated.

.12 Grout under base plates and slabs using procedures in accordance with manufacturer's recommendations which result in 100% contact over grouted area.

.13 Waterstops:
.1 Install waterstops as per manufacturer’s recommendations, to provide continuous water seal.
.2 Do not distort or pierce waterstop in way as to hamper performance.
.3 Do not displace reinforcement when installing waterstops.
.4 Use equipment to manufacturer's requirements to field splice waterstops.
.5 Tie waterstops rigidly in place.
.6 Use only straight heat-sealed butt joints in field.
.7 Use factory welded corners and intersections.

.14 Waterproofing Bands
.1 Install waterproofing bands as per manufacturer’s recommendations, so to provide continuous water seal.

.2 Prepare substrate surface as per manufacturer's recommendations.
.3 Do not distort or pierce waterproofing bands in way as to hamper performance.
.4 Do not displace reinforcement when installing waterproofing bands.
.5 Use equipment to manufacturer's requirements to field splice waterproofing bands.

.15 Joint Seals
.1 Furnish pre-formed joint seal for each joint in single piece for depth and width required for joint, unless otherwise authorized by Departmental Representative.
.2 When more than one piece is required for joint, fasten abutting ends as per manufacturer's recommendations.
.3 Locate and form construction and expansion joints as indicated.
.4 Install pre-formed closed cell joint seal in expansion joints as indicated on drawings and in accordance with manufacturer's recommendations.
.5 Joint seal material to be sized 25% larger than the joint opening, unless otherwise authorized by Departmental Representative.
.6 Prepare substrate surface as per manufacturer's recommendations.

.16 Polyurethane Joint Sealant
.1 Prepare joint and apply polyurethane joint sealant as per manufacturer's recommendations.

3.3 TEMPERATURE CONTROL

.1 For concrete elements of thickness 1000 mm or greater and for all concrete elements poured under cold weather conditions, install thermocouples in order to monitor the temperature of concrete at the core and at 75 mm from the outside face and outside of the form. The temperature at the core of the element shall not exceed 65°C and the thermal gradient within the element shall not exceed 20°C. The temperature difference between the concrete surface and ambient air shall be no greater than 12°C. The number and location of thermocouples shall appear on the formwork shop drawings submitted to the Departmental Representative for approval.

.2 Maintain concrete at following temperatures:
.1 For an initial 3 days, at a temperature of not less than 15 degrees Celsius nor more than 27 degrees Celsius at concrete surfaces.
.2 Cure at not less than 10 degrees Celsius for an additional 4 days.

.3 Keep concrete surfaces moist continuously while protected.

.4 Reduce temperature at a rate not exceeding 10 degrees Celsius per 24 hours until outside temperature has been reached.

.3 Begin recording concrete temperatures at the start of placement. The temperature shall be recorded automatically at intervals no greater than 1 hour until the end of the monitoring period. The monitoring period shall be 7 days.

.1 Provide access to Departmental Representative to verify temperature readings. Digital temperature indicators shall be left in place until the end of the monitoring period. If the data logger does not have a digital display that allows the Departmental Representative to verify temperature, provide the necessary instruments to allow the Departmental Representative to verify thermocouple function and readings.

.4 The Contractor shall take necessary action to maintain the temperature within the specified limits.

3.4 FINISHING AND CURING

.1 Refer to Section 03 35 00 – CONCERTE FINISHING for for finishing requirements.

.2 Use procedures as approved by the Contractor’s QVE and reviewed by the Departmental Representative, or those noted in CSA A23.1/A23.2 to remove excess bleed water. Ensure surface is not damaged.

.3 Cure and protect concrete to CSA A23.1/A23.2, section 7.7. All concrete shall receive moist curing for a period of seven days.

.1 Unformed surfaces: cure with burlap and water. Presoak burlap by immersing in water for a period of 24 hours, immediately prior to placing. Carefully place two layers of damp, non-staining burlap on the surface of the concrete. Overlap each strip by at least 150 mm and secure against displacement by wind. Maintain burlap in place and keep thoroughly wet for 7 days after day of placing.

.2 Formed surfaces: if formwork is left in place for 7 days or more, no additional curing will be required. If formwork is removed in less than seven days, curing in manner specified for unformed surfaces for remainder of seven day period.

.4 During curing period, uncover only such areas as are immediately needed for finish treatment, recover and continue curing.

3.5 SURFACE TOLERANCE

.1 Concrete tolerance for cast-in-place and pre-cast items to CSA A23.1/A23.2, Class B, Straightedge Method CSA A23.1/A23.2, and in accordance with Drawings.

.2 Unformed surface concrete tolerance to conventional classification in accordance with straightedge method, as per Class B in Table 21.

.3 Concrete tolerance for tying-in to existing surfaces: ± 3 mm.

.4 For precast deck slabs:
- .1 Fabricate and erect precast elements within allowable tolerances, in accordance with CSA A23-4.
- .2 Set elevations and alignment between units to within allowable tolerances.
- .3 Once all precast units are installed as per specifications, obtain written approval from the Departmental Representative prior to grouting the openings of lifting devices and installing joint seals between units.

.5 For second stage concrete:
- .1 Meet tolerances specified in Section 35 20 17.02 - TIMBER STOPLOGS, SILLS AND GAINS after the final installation of embedded parts.
- .2 Surfaces for which the specified tolerances are less than 1 mm shall be met based on readings taken at least every 300 mm. For other surfaces for which the tolerance was specified, tolerances shall be checked based on readings taken at least every 600 mm.
- .3 Machined surfaces shall be smooth and free of any scratches. If the case arises, repair damaged surfaces so as to meet the specified tolerances.
- .4 At the joint between different sections of the embedded parts, the guide and watertight surfaces shall be smooth.
- .5 Submit for review, fabrication control methods for embedded parts, ensuring that tolerances specified will be met during assembly and after concreting.

3.6 FIELD QUALITY CONTROL

.1 The responsibility for all quality control testing of concrete lies with the Contractor.

.2 Field tests: for each concrete pour, conduct tests as follows in accordance with Section 01 45 00 - QUALITY ASSURANCE AND QUALITY CONTROL and submit report as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.
- .1 Concrete pours at point of discharge:
- .2 Slump.
- .3 Air content.
- .4 Concrete temperature.
- .5 Field-cured Concrete Cylinders:
  - .1 Compressive strength at 3, 7 and 56 days for Concrete Mix 1.
  - .2 Compressive strength at 3, 7 and 28 days for Concrete Mixes 2 to 5
- .6 Lab-cured Concrete Cylinders:
  - .1 Compressive strength at 3, 7 and 56 days for Concrete Mix 1, and as requested by the Departmental Representative
  - .2 Compressive strength at 3, 7 and 28 days for Concrete Mixes 2 to 5, and as requested by the Departmental Representative

.3 Inspection and testing of concrete and concrete materials will be carried out by an independent testing laboratory for review to CSA A23.1/A23.2.
- .1 Ensure testing laboratory is certified to CSA A283.
- .2 Results of the testing to be submitted directly to the Departmental Representative, with the Contractor in copy.

.4 Perform Testing at the following frequency:
- .1 Air, Slump, and Temperature Tests: For each Concrete Mix, one test for each load of concrete until satisfactory control is established daily and rate of placement > 35 m^3 per hour; Once satisfactory control is established for the day and rate of placement > 35 m^3 per hour, 1 test for each 3 loads of concrete. Satisfactory control is considered to have been established when tests on five consecutive loads or batches of concrete are within specification requirements.
- .2 Compressive Test Cylinders: One set per day for each concrete pour of up to 50 m^3, of each Concrete Mix, of each type of element.
- .3 A set of Compressive Test Cylinders shall consist of the following, for each Mix of Concrete:
  - .1 Eight (8) cylinders: 3 field-cured cylinders that shall be broken at 3, 7 and 28/56 days, 3 lab-cured cylinders that shall be broken at 3, 7 and 28/56 days, and 2 spare cylinders to be lab-cured and

broken upon request by the Departmental Representative.

.5 Submit compressive strength test report within three (3) working days of test completion.

.6 The responsibility for casting any additional cylinders required for interim testing lies with the Contractor.

.7 Ensure there is no accelerated curing of concrete cylinders.

.8 Ensure test results are distributed for discussion at pre-pouring concrete meeting between testing laboratory, the Contractor's QVE and the Departmental Representative.

.9 Take additional test cylinders during cold weather concreting. Cure cylinders on job site under same conditions as concrete which they represent.

.10 Non-Destructive Methods for Testing Concrete: to CSA A23.1/A23.2.

.11 Remove and replace any concrete that is found to not meet specified criteria based on tests performed.

.1 Strength acceptance criteria from cylinder tests will be in accordance with CSA A23.1/A23.2 except as follows:

.1 Concrete shall be considered defective when a cylinder test fails to meet specified strength. In such cases concrete in that section may be checked by Departmental Representative by core specimens drilled and tested in accordance with CSA A23.2. All concrete core extraction and testing shall be conducted by a third-party inspection company with a CSA certified testing laboratory with Category I certification.

.2 Consider concrete defective if it is structurally unsound, significantly cracked, lacks moisture resistance, honeycombed or improperly finished, as determined by the Departmental Representative.

.3 The Departmental Representative has the right to require replacement, strengthening or correction of impacted portions of defective concrete structure to acceptance of the Departmental Representative.

.4 Bear all cost of rectifying defective concrete including inspections, design, coring, testing, strengthening,

demolishing, and replacement. Bear investigation and evaluation cost even if further evaluation of design allows unit to be classed as acceptable concrete.

.12 Inspection or testing by Departmental Representative will not augment or replace Contractor quality control nor relieve Contractor of his contractual responsibility.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 ASTM
- .1 ASTM C309 - 19 Specification for Liquid Membrane Forming Compounds for Curing Concrete.
- .2 ASTM E1155M - 20 Test Method for Determining FF Floor Flatness and FL Floor Levelness Numbers.

.2 Canadian General Standards Board (CGSB)
- .1 CGSB 25.20-95, Surface Sealer for Floors.
- .2 CGSB 51 GP 51M-81 Polyethylene Sheet for Use in Building Construction.

.3 CSA International
- .1 CSA A23.1:19/A23.2:19, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.

1.2 ACTIONS AND INFORMATIONAL SUBMITTALS

.1 At least four (4) weeks prior to beginning concrete Work, submit submittals in accordance with Section 01 33 00 – SUBMITTAL PROCEDURES.

.2 Product Data:
- .1 Provide manufacturer's printed product literature and data sheets for concrete finishes and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 ENVIRONMENTAL REQUIREMENTS

.1 Work area:
- .1 Make work area water tight protected against rain and detrimental weather conditions.

.2 Temperature:
- .1 Maintain ambient temperature of not less than 10 degrees C from 7 days before installation to at least 48 hours after completion of work and maintain relative humidity not higher than 40% during same period.

.3 Moisture:
- .1 Ensure concrete substrate is within moisture limits prescribed by manufacturer.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements:
.1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

.3 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding and packaging materials in accordance with Section 01 74 21 - CONSTRUCTION/DEMOLITON WASTE MANAGEMENT.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Curing Compound:
.1 ASTM C309, Type 2.
.2 Combination curing and sealing compound: ASTM C309; Clear, non-yellowing compound.

.2 Floor Hardener:
.1 Nonmetallic and non-coloured floor hardener: Premixed blend of mineral aggregates and densifying agents, and Portland cement, shake on type; Durag Premium by Sternson Ltd.; Diamag 7 by Sika Canada Inc., Maximent by Master Builders Technologies, Ltd.; Surflex by Euclid Admixture Canada, Inc.; or Quartz Tuff by Dayton Superior Canada Limited.

.3 Surface Sealer:
.1 Clear, liquid surface hardener and dustproofer; Florseal by Sternson Ltd; Sealhard 400 by Sika Canada Inc., Floor Seal by Euclid Admixture Canada, Inc., or Day Chem Sure Hard (J 17) by Dayton Superior Canada Limited.

.4 Wet Curing materials:
.1 Non staining waterproof curing paper, burlap, or canvas coverings.

PART 3 - EXECUTION

3.1 DEFECT REPAIRS

.1 General
.1 Provide smooth form finish in accordance with CSA A23.1 for architectural concrete.

.2 Provide Formed and Unformed Finishes for concrete elements as specified on Drawings.
.3 Remove face formwork as soon as practical to facilitate repair of surface defects. Surface defects include formwork tie holes, bugholes with nominal diameter or depth greater than 6 mm, honeycomb and defective concrete, fins, projections, irregularities, offsets, spalled corners, and other defects.
.4 Avoid damaging corners and keep edges sharp.

.2 Formwork Tie Holes:
.1 Cut formwork ties 25 mm from surface of concrete.
.2 Make edges of depressions sharp.
.3 Fill depressions with pre-blended non shrink non-ferrous grout of same colour as the concrete for exposed concrete surfaces.

.3 Irregularities:
.1 Grind smooth fins, projections, irregularities, and offsets, including those at visible construction joints.
.2 Where irregularities and offsets cannot be remedied by grinding, chip concrete surface sufficiently deep and apply thoroughly bonded pre-blended non shrink non-ferrous grout in similar procedure for repair of honeycomb and defective concrete.

.4 Surface Depressions:
.1 Fill bugholes, and other surface depressions with a sand cement mortar to match the surface of surrounding concrete.

.5 Spalled Corners:
.1 Use repair materials of similar appearance and strength as the surrounding concrete to reconstruct corner to match adjacent corners.

.6 Honeycomb and Defective Concrete:
.1 Do not repair honeycomb and defective concrete until reviewed by Departmental Representative and permission granted to proceed with the repair work.
.2 Remove honeycomb and defective concrete down to sound concrete with edges slightly undercut or perpendicular to the surface. Remove a minimum depth of 25 mm. No feather edges are permitted.
.3 Pre-dampen patch area.
.4 Use pre-Cblended non shrink non-ferrous grout of same colour as the concrete for exposed concrete surfaces.
.5 Use bonding agents in patching work.

.6 Patch surface slightly higher than the surrounding concrete.
.7 Wet cure patches to equivalent of 10 days minimum.
.8 When patched surface has hardened, rub surface with carborundum brick to a true surface, free from streaks, discolourations, and other imperfections, to match flush with surrounding concrete.

3.2 CONCRETE FINISHING

.1 Concrete Finish:
.1 Provide Formed and Unformed Finishes for concrete elements as specified on Drawings.
.2 Use only rough plywood formwork.
.3 Finish tolerances are for architectural concrete as appearance is of critical importance.
.4 Use procedures as noted in CSA A23.1/A23.2 to remove excess bleed water during wet finish operations. Ensure surface of concrete is not damaged during bleed water removal.
.5 On completion thoroughly wash the surfaces with clean water.

.2 Related Unformed Surfaces:
.1 Finishing, for unformed surfaces, shall commence after the bleed water has disappeared and when concrete has stiffened sufficiently to prevent the working of excess mortar to the surface. No additional water shall be used to facilitate finishing.
.2 Provide a flat board screed finish for top of piers, walls or buttresses, horizontal offsets, and similar unformed surfaces occurring in units cast in forms to a texture consistent with that specified for the formed surface unless specified on Drawings.

.3 Concrete edging:
.1 Provide rounded edging as per Drawings and Section 03 10 00 – CONCRETE FORMING AND ACCESSORIES.

.4 Underside Elevated Slab Finish:
.1 After forms are removed grind off projections and patch defective areas.

.5 Slabs or Floor Surfaces, including Decks and Gravity Dam Crests:
.1 Provide a flat board screed finish. Troweled edges will not be permitted.
.2 Finish tolerances are for architectural concrete as appearance is of critical importance.

.3 Ensure slabs and floor surfaces are sealed prior to applying the flat board screen finish.

.6 Water Passages

.1 For exposed surfaces and surfaces that will conduct low velocity water flow (unformed rollway sections). After the concrete has hardened sufficiently, the concrete finish shall be floated by hand or machine sufficiently only to produce a uniform surface free from screed marks.

.2 Finish tolerances are for architectural concrete as appearance is of critical importance.

.7 Construction Joints

.1 Green cut concrete surfaces to receive subsequent concrete lifts to a 5 mm amplitude 24 hrs following initial concrete placement.

3.3 CURING CONCRETE

.1 Refer to 03 30 00 Cast-in-place and Precast Concrete for curing requirements.

END OF SECTION

PART 1 - GENERAL

1.1 DESCRIPTION

.1 This Section specifies the requirements for the supply, installation, testing and tensioning of the post-tensioned rock anchors required Phase 1 works on the Existing Dam.

1.2 RELATED REQUIREMENTS

.1 Section 03 30 00 – CAST-IN PLACE AND PRECAST CONCRETE.

.2 Section 05 50 00 – METAL FABRICATIONS.

1.3 REFERENCES

.1 American Society for Testing and Materials (ASTM):

.1 ASTM A722/A722M-18 Standard Specification for High-Strength Steel Bars for Prestressed Concrete.

.2 ASTM A29/A29M-16 Standard Specification for General Requirements for Steel Bars, Carbon and Alloy, Hot-Wrought.

.3 ASTM A536-84 (2019) Standard Specification for Ductile Iron Castings.

.4 ASTM A36/A36M-19 Standard Specification for Carbon Structural Steel.

.5 ASTM A572/A572M-18 Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.

.6 ASTM D1743-13(2018) Standard Test Method for Determining Corrosion Preventative Properties of Lubricating Greases

.7 ASTM D1785-15e1 Standard Specification for Poly(Vinyl Chloride)(PVC) Plastic Pipe, Schedules 40, 80 and 120.

.2 Post-Tensioning Institute (PTI):

.1 PTI DC35.1 (2014) Recommendations for Prestressed Rock and Soil Anchors.

.2 PTI M10.2 (2017) Specifications for Unbonded Single Strand Tendons.

.3 PTI TAB.1 (2006) Post-Tensioning Manual.

1.4 MEASUREMENT AND PAYMENT PROCEDURES

.1 Measurement and Payment in accordance with Section 01 22 01 – MEASUREMENT AND PAYMENT.

1.5 DEFINITIONS

.1 Seal length: Portion of the tendon that transfers force to the underlying rock.

.2 Free length: Unsealed portion of the length of the tendon that is free to deform during tensioning.

.3 Post-tensioned rock anchor: The complete anchor assembly, including threaded bar, corrosion protection system and all associated hardware.

.4 Tendon: 150 KSI threaded bar conforming to ASTM A722, Type II.

.5 Design load (DL): Unfactored load applied to the anchor. DL = 633 kN.

.6 Test load (TL): Maximum load applied to the anchor during the tension test. TL = 843 kN.

.7 Lock-off load (LL): Final load applied to the anchor after tension test is complete. LL = 738 kN.

1.6 ACTION AND INFORMATIONAL SUBMITTALS

.1 Four (4) weeks prior to beginning of Work, submit in accordance with Section 01 33 00 - SUBMITTAL PROCEDURES.

.2 Post-Tensioned Rock Anchor Plan:

.1 Hole drilling procedure including description of drilling equipment and any required temporary measures required for access of said equipment to the required locations for drilling.

.2 Contractor's installation procedures, including water tightness testing procedure, anchor grouting procedure and anchor testing procedure.

.3 Shop drawings showing complete post-tensioned rock anchor assembly, identifying anchor tendons and all associated hardware, with seal and free lengths of anchor clearly identified.

.4 Material Technical Data Sheets (MTDS)

.5 Material Safety Data Sheets (MSDS)

.6 Manufacturer's recommended installation procedures.

.7 Calibration certificates for pressure gauges.

.3 Keep copy of accepted Contractor's installation procedures and Manufacturer's Material Technical Data Sheets, Material Safety Data Sheets, and recommended installation procedures at work site.

.4 Prior to the installation of the post-tensioned rock anchors, the water tightness test report shall be submitted to the Departmental Representative.

.5 Following the tensioning testing of the post-tensioned rock anchors, submit the following test results:

.1 Creep test.

.2 Initial load test.

.3 Final lock-off load of each anchor.

1.7 QUALITY ASSURANCE

.1 Quality Assurance: in accordance with Section 01 45 00 - QUALITY ASSURANCE AND QUALITY CONTROL.

.2 Prior to the installation of post-tensioned anchors, the Contractor shall conduct a pressurized water test on each bore hole, as outlined in this Specification, in the presence of the Departmental Representative. The purpose of this test is to determine water absorption within the borehole prior to anchor installation.

.3 After post-tensioned rock anchors have been installed and grouted and grout has set, the Contractor shall conduct tension testing of the anchor tendons as outlined in this Specification, in the presence of the Departmental Representative. The Contractor shall hire a third party laboratory to measure and record the required test data during the tension test. The third party laboratory shall submit to the Departmental Representative a tension test report certifying that each anchor meets the criteria outlined in this specification and indicating final lock-off load for each anchor.

1.8 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - COMMON PRODUCT REQUIREMENTS and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials in dry location indoors off ground and in accordance with manufacturer's recommendations in clean, dry, well- ventilated area.

.2 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Post-tensioned rock anchors to be supplied and installed complete with all related accessories as specified by manufacturer, as well as any additional accessories indicated on drawings or described in these specifications.

.2 Anchor tendons: 150 KSI threaded bars in accordance with ASTM A722/A722M, Type II.

.3 PVC sleeve and bolt cover cap: in accordance with ASTM D1785, Schedule 40.

.4 Grout tube: In accordance with manufacturer’s recommendations.

.5 Base plates: In accordance with CSA G40.20/G40.21, Grade 300W, to the dimensions shown on the drawings.

.6 Couplings: In accordance with ASTM A29/A29M, Grade C1045.

.7 Hex Nuts: In accordance with ASTM A29/A29M, Grade C1045.

.8 Grease: In accordance with ASTM D1743.

.9 PVC centralizers: In accordance with ASTM D1785, schedule 40. Maximum spacing = 2.5 m.

.10 Shrinkage compensating grout in accordance with Section 03 30 00 – CAST-IN-PLACE AND PRECAST CONCRETE.

2.2 TENSIONING SYSTEM

.1 Unless otherwise recommended by the anchor manufacturer, tensioning of the rock anchors shall be performed using a hydraulic jack.

.1 The Contractor shall supply anchor tendons of sufficient length so that once installed in boreholes, a sufficient length of threaded bar protrudes from the anchor head for installation of the hydraulic jack.

.2 The hydraulic jack shall be capable of applying at least 120% of the specified test load (TL).

.3 The hydraulic jack shall include a calibrated pressure gauge, indicating the applied pressure with ±3% precision.

.4 The hydraulic jack and pressure gauge will have been calibrated by a recognized institution at least 4 weeks prior to use on this project.

PART 3 - EXECUTION

3.1 DRILLING

.1 Minimum penetration of anchors into competent rock as well as positioning of the anchors shall be as shown on the drawings.

.2 Boreholes shall be drilled using percussive or rotary drilling equipment.

.3 Boreholes shall have diameters, positioning and orientation as indicated on drawings.

.4 Borehole maximum deviation with respect to the vertical axis shall not exceed 2%.

.5 When boring is complete, all boreholes shall be cleaned and protected against obstruction or clogging, using caps or other acceptable methods. Any obstructed or clogged holes shall be cleaned or replaced by other

holes proposed by the Contractor and approved by the Departmental Representative.

3.2 WATER TIGHTNESS TEST

.1 Prior to the installation of post-tensioned anchors with sleeves, the Contractor shall conduct a pressurized water tightness test on each borehole.

.2 The test shall be performed in accordance with the procedures of PTI DC35.1, paragraph 7.4.

.3 The test shall be performed over the entire depth of the hole.

.4 The test must last ten minutes at a pressure of 35 kPa at the collar.

.1 If, after a period of 10 minutes, the rate of water absorption is greater than 0.006 liters per centimeter of borehole diameter per meter of hole depth per minute, the borehole must be injected and re-drilled once the shrinkage compensating grout has hardened.

.2 If injection of boreholes is required, the injection grout must be a flowable non shrink grout with antiwashout additive. The grout specification should be submitted 2 week before use. The injection grout must have a fluid consistency and be capable of reaching a minimum compressive resistance of 40 MPa at 28 days

.5 The Departmental representative hall be present during all pressurised water tightness test. The Contractor shall provide at least 7 days notice to the Departmental Representative prior to conducting water tightness testing.

3.3 INSTALLATION

.1 Grouting length shall be as specified on the drawings.

.2 Grout batching and injection equipment shall be capable of producing and pumping grout continuously, in such a manner as to avoid the formation of clumps or non-dispersed cement.

.3 All grouting works shall be executed under the supervision of an independent laboratory.

.1 Provide data and test results showing that the grout in place meets performance requirements for the shrinkage compensating grout.

.4 Once grouting is complete, the anchors must not be displaced until the grout has reached a minimum compressive resistance of 25 MPa. Tensioning must be performed after the grout has reached at least 30 MPa compressive strength.

3.4 TESTING

.1 A tension test shall be performed on each anchor, up to the test load, in the presence of the Departmental Representative. The Contractor shall provide at least 7 days notice to the Departmental Representative prior to performing tension testing.

.2 The tension test shall be performed by incrementally increasing the load on the anchor during the test. The load increments to be applied shall be: 0.25xTL, 0.5xTL, 0.75xTL and 1.0TL. Each load increment shall be held for a duration of 1 minute, with the exception of the 1.0xTL increment which shall be held for a duration of 10 minutes for the creep test. Elongation of the tendon shall be measured at 0, 1, 2, 5 and 10 minutes.

.3 Acceptance criteria: based on extension measurements at the anchor head during the test, an anchor shall be rejected in the event that either of the following criteria are not met:

.1 The total movement of the anchor head shall be greater than 80% of the theoretical extension along the free length, and less than 100% of the

free length elongation plus 50% of the seal length.

.2 Creep measured at the anchor head shall not exceed 1.5 mm during the 10 minutes creep test.

.4 The Contractor shall be responsible to take any required action to remedy any defective anchors, including installation of new replacement anchors if required, to the satisfaction of the Departmental Representative and at no additional cost to the Owner.

3.5 LOCK-OFF

.1 Upon completion of the tension testing, the Contractor shall lock-off each anchor at the specified lock-off load.

.2 Once anchors have been locked off, the Contractor shall install PVC bolt cover caps and cover anchor head niches, as shown on the drawings.

END OF SECTION

PART 1 - GENERAL

1.1 DESCRIPTION

.1 This Section specifies the requirements for the supply and installation of all fabricated steel parts required to complete the work, including but not limited to all embedded parts, anchors, fasteners, handrails, baseplates, frames, gratings or other metal parts as shown on the Drawings.

1.2 RELATED REQUIREMENTS

.1 Section 09 97 01 - PAINTING STEEL SURFACES.

1.3 REFERENCES

.1 ASTM International
- .1 ASTM A123/A123M-17, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- .2 ASTM A153/A153M-16a, Standard Specification for Zinc (Hot-Dip Galvanized) Coating on Iron and Steel Hardware.
- .3 ASTM A193/A193M-19, Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature of High Pressure Service and Other Special Purpose Applications.
- .4 ASTM A194/A194M-18, Standard Specification for Carbon Steel, Alloy Steel and Stainless Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both.
- .5 ASTM A240/A240M-19, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
- .6 ASTM A304-16, Standard Specification for Carbon and Alloy Steel Bars Subject to End-Quench Hardenability Requirements.
- .7 ASTM A307 - 14e1, Standard Specification for Carbon Steel Bolts and Studs, 60000 PSI Tensile Strength.
- .8 ASTM A492-95(2019), Standard Specification for stainless steel rope wire.
- .9 ASTM A780/A780M-09(2015), Standard Practice for Repair of Damaged and uncoated Areas of Hot-Dip Galvanized Coatings.
- .10 ASTM B308/B308M-10, Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles.
- .11 ASTM D412 - 16, Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension.

.12 ASTM D471-16a, Standard Test Method for Rubber Property – Effect of Liquids.
.13 ASTM D573-04 (2019), Standard Test Method for Rubber – Deterioration in an Air Oven.
.14 ASTM D624-00 (2020), Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomer.
.15 ASTM D2240 - 15e1, Standard Test Method for Rubber Property-Durometer Hardness.
.16 ASTM F593-17, Standard Specification for Stainless Steel Bolts, Hex Cap Screws and Studs.
.17 ASTM F594-09(2015), Standard Specification for Stainless Steel Nuts.
.18 ASTM F3125/F3125M-19, Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions.

.2 CSA International
.1 CSA G40.20/G40.21-13 (R2018), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
.2 CSA G164-18, Hot Dip Galvanizing of Irregularly Shaped Articles.
.3 CSA S16-19, Design of Steel Structures.
.4 CSA W47.1-19-Certification of Companies for Fusion Welding of Steel Structures.
.5 CSA W48-18, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).
.6 CSA W55.3-08 (2018), Certification of companies for resistance welding of steel and aluminum.
.7 CSA W59-18, Welded Steel Construction.
.8 CSA W59.2-18, Welded Aluminum Construction.

.3 American Welding Society (AWS)
.1 AWS D6.1/6.1M-17, Structural Welding Code-Stainless Steel.
.2 AWS B2.1/B2.1M-15, Specification for Welding Procedure and Performance Qualification

.4 National Association of Architectural Metal Manufacturers
.1 NAAMM MBG 533.09 – Welding Specifications for Fabrication of Steel, Aluminum and Stainless Steel Bar Grating.

.5 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
.1 Safety Data Sheets (SDS).

.6 American Association of State Highway and Transportation Officials (AASHTO)

.1 AASHTO LRFDLTS-1-15 including 2020 Interim Revisions, Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals.

.7 Canadian Dam Association (CDA)
.1 Signage for Public Safety Around Dams.

1.4 PRICE AND PAYMENT PROCEDURES

.1 Payments related to this Section shall be as set out in Section 01 22 01 – MEASUREMENT AND PAYMENT.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

.1 Four (4) weeks prior to beginning of Work, submit in accordance with Section 01 33 00 - SUBMITTAL PROCEDURES.

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for traffic signage, structural sections, plates, checkered plates, pipes, bolts, gratings, anchor bolts, adhesive anchors, neoprene rubber pads and strips, adhesives and include product characteristics, performance criteria, physical size, finish and limitations.
.2 Submit two copies of WHMIS MSDS in accordance with Section 01 35 29.06 - HEALTH AND SAFETY REQUIREMENTS, Section 01 35 43 – ENVIRONMENTAL PROCEDURES and Section 01 35 46 – ARCHEOLOGICAL AND CULTURAL PROCEDURES.
.1 For finishes, coatings, primers, and paints applied on site: indicate VOC concentration in g/L.

.3 Shop Drawings for all items being fabricated:
.1 Submit drawings stamped and signed by Professional Engineer registered or licensed in the Province of Ontario, Canada.
.2 Indicate materials, sign supporting structures, mounting requirements, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

.4 Qualifications, test reports and certifications as required by specifications.

1.6 QUALITY ASSURANCE

.1 Welder Qualifications:

.1 Weld structural Steel components in accordance with CSA W59, and by a fabricator fully certified by the CWB to conditions of CSA W47.1 and CSA W55.3 as applicable.
.2 Weld structural Aluminum components in accordance with CSA W59.2, and by a fabricator fully certified by the CWB to conditions of CSA W47.1 and W55.3 as applicable.
.3 Weld stainless steel components in accordance with AWS D1.6/D1.6M, and by a fabricator fully certified as per AWS B2.1/B2.1M as applicable.

.2 Test Reports: before fabrication begins, submit certified test reports showing compliance with specified performance characteristics and physical properties.

.3 Certifications: before fabrication begins, submit mill test certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.4 Unless otherwise specified on the Drawings or for particular components covered in other specifications sections, the following minimum welding inspection requirements apply:

Type of Weld	**Type of Inspection**	**Extent of Inspection**
All weld types	Visual	100%
All weld types	Dye penetrant	10%

.5 Engage a qualified inspector to perform weld inspections. Welding inspection reports to be transmitted to the Departmental Representative.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
.1 Store materials in dry location indoors off ground and in accordance with manufacturer's recommendations in clean, dry, well- ventilated area.
.2 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Include all materials, products, accessories, and supplementary parts necessary to complete the assembly and installation of metal fabrications specified in this specification section.

.2 Incorporate only metals that are free from defects which impair strength or durability, or which are visible. Install only new metals of best quality, and free from rust or waves and buckles and that are clean, straight, and with sharply defined profiles.

.3 Rolled structural steel sections and bars: to CSA G40.20/G40.21, Grade 350W.

.4 Hollow structural steel sections: to CSA G40.20/G40.21, Grade 350W, Class C.

.5 Steel angles and plates to CSA G40.20/G40.21, Grade 300W.

.6 Welding materials: to CSA W59.

.7 Welding electrodes: to CSA W48 Series.

.8 Aluminum angles and plates to be A6061-T6.

.9 Aluminum gratings to be A6063-T6.

.10 Stainless steel pier nosing:
- .1 Protective plate to ASTM A240/A240M, Type 316
- .2 Angles to ASTM A276/A276M, Type 316.

.11 Ultra Strength Multipurpose Neoprene Rubber:
- .1 Minimum Hardness, Shore A durometer of 75, as per ASTM D2240.
- .2 Minimum Tensile Strength of 900 psi (6.2 MPa), as per ASTMD412.
- .3 Minimum Compression Strength of 10,000 psi (68.9 MPa).
- .4 Minimum Tear Strength of 360 psi (2.48MPa) min, as per ASTM D624, Die B.
- .5 Maximum change in Tensile Strength of 25%, as per ASTM D573.
- .6 Maximum elongation of 25%, as per ASTM D573.
- .7 Maximum change in Hardness of 10, as per ASTM D573.
- .8 Maximum increase in volume of 120%, as per ASTM D471.
- .9 Adhesive used for fixing Neoprene to galvanised steel to be compatible with the materials and have:

.1 Minimum Shore Hardness, A durometer of 80.
.2 Minimum Tensile Strength of 1000 psi (6. 9 MPa).
.3 Minimum Shear Strength of 1500 psi (10.3 MPa).
.4 Maximum coefficient of thermal change: 10 x 10^{-6}
.5 Minimum Glass Transition Temperature of 55°C

.12 Bolts, Nuts and Washers to ASTM A325M.

.13 Grout: non-shrink, non-metallic, flowable, 15 MPa at 24 hours.

.14 Anchor bolts and studs, and nuts (to concrete): Stainless Steel Type 304, to ASTM A193/A193M Grade B8, and ASTM A194/A194M Grade 8 respectively unless specified otherwise.

.15 Fasteners: lag screws to be stainless steel Type 304 unless otherwise specified

2.2 FINISHES

.1 Refer to Section 09 97 01 - PAINTING STEEL SURFACES.

2.3 GAIN COVERS AND FRAMES

.1 As indicated on Drawings.

.2 Gain Cover Assemblies and Frames to be hot-dip galvanized after assembly and fabrication, as per Section 09 97 01 – PAINTING STEEL SURFACES

2.4 PIER NOSING PROTECTIVE PLATE

.1 As indicated on Drawings.

2.5 SIGNAGE SUPPORTS

.1 For signage supports not shown on drawings, provide signage supports capable of meeting the design criteria below.
.1 Sign supports to be capable of withstanding the combination of following loads:
.1 Wind loads in any direction of 1.7 kPa on signboards and 1.7 kPa on sign supports.
.2 Dead load of signboards and sign supports.
.2 Sign supports to consist of steel posts: to CSA G40.20/G40.21, flanged "U" shaped in cross section. Hot dipped galvanized: to ASTM A123/A123M, minimum zinc coating 610 g/m2.

.1 Fasteners: bolts, nuts, washers and other hardware for roadside signs to be cast aluminum alloy, or galvanized steel.
.2 Posts to be of sufficient length to allow for installing signage entirely above Elevation 243 m.

.3 Structural deflections and vibration of sign supports in accordance with American Association of State Highway and Transportation Officials (AASHTO LRFDLTS-1), "Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals”.

2.6 METALS INTERACTION

.1 Aluminium to remain isolated from steel using ultra strength multipurpose Neoprene rubber pad, permanently fixed to the supporting steel frame with adhesive, applied as per manufacturer’s recommendations.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for metal fabrications installation in accordance with manufacturer's written instructions.
.1 Visually inspect substrate in presence of the Contractor’s QVE and the Departmental Representative.
.2 Inform the Departmental Representative of unacceptable conditions immediately upon discovery.
.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from the Contractor’s QVE and review by the Departmental Representative.

3.2 FABRICATION

.1 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.

.2 Use self-tapping shake-proof flat headed screws on items requiring assembly by screws or as indicated.

.3 Where possible, fit and shop assemble work, ready for erection.

.4 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush and radius all sharp corners.
  .1 Ensure welds are compatible with coating and do not generate undue accumulation of material during hot dip galvanization

.5 Make allowance for thermal expansion and contraction when fabricating exterior work.

.6 Grind sharp edges smooth.

3.3 ERECTION

.1 Do welding work in accordance with CSA W59 and W59.2 (CWB) unless specified otherwise.
  .1 Welding required for stainless steel pier nosing to conform to AWS – D1.6/D1.6M

.2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections. The various elements shall be securely fixed and adequately braced to ensure precise location and to avoid any warpage, misalignment or deformation during erection.

.3 Provide suitable means of anchorage acceptable to the Departmental Representative such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.

.4 Exposed fastening devices to match finish and be compatible with material through which they pass; that is must be galvanized.

.5 Supply components for work by other trades in accordance with shop drawings and schedule.

.6 Make field connections with bolts to CSA S16. The welding inspection requirements given in Sub-section 1.5 - Quality Assurance also apply to field welds.

.7 Deliver items over for casting into concrete together with setting templates to appropriate location and construction personnel.

.8 Touch-up galvanized surfaces with zinc rich primer where damaged.
  .1 Touch-Up Paint per manufacturer specifications.
  .2 Touch-Up Primer for Galvanized Finish: SPCC - Paint 20 Zinc-Rich Primer Type I Inorganic.
  .3 Pre-treat damaged surfaces as per manufacturer’s instructions.

3.4 GAIN COVERS

.1 Install gain covers on supporting frames as indicated.

3.5 SIGNAGE SUPPORTS

.1 Erect sign supports as indicated. Permissible tolerance: 25 mm maximum departure from vertical for direct buried supports.
  .1 Erect posts plumb and square.
  .2 If rock or concrete is encountered, drill hole to required depth and set post in sand.
  .3 If installing on bedrock, drill hole to a depth of 750 mm and set post in non-shrink grout.

.2 Fasten signboard to supporting post(s) and bracket(s), ensuring that entire signage is located above Elevation 243 m.

.3 Correct defects, identified by Departmental Representative, in sign message, consistency of reflectivity, colour or illumination. Correct angle of signboard and adjust luminaire aiming angle for optimum performance during night conditions to approval of Departmental Representative.

.4 Traffic Signage:
  .1 Install signage to the requirements of the local authority. As a minimum, install to the same conditions of the original signage.

3.6 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by metal fabrications installation.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Material fabrication and installation of handrails including gates, as shown on the Contract drawings

1.2 RELATED SECTIONS

.1 Section 05 50 00 – METAL FABRICATIONS

.2 Section 09 97 01 – PAINTING STEEL SURFACES

1.3 MEASURMENT AND PAYMENT

.1 Payments related to this Section shall be as set out in Section 01 22 01 – MEASUREMENT AND PAYMENT.

1.4 REFERENCE STANDARDS

.1 ASTM International
- .1 ASTM A193/A193M-19, Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature of High Pressure Service and Other Special Purpose Applications.
- .2 ASTM A194/A194M-18 Standard Specification for Carbon Steel, Alloy Steel and Stainless Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both.
- .3 ASTM E935-13e1, Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings.
- .4 ASTM F3125/F3125M-19, Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength.
- .5 ASTM A307-14, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.2 CSA International
- .1 CSA G40.20-13/G40.21-13 (R2018), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel
- .2 CSA W59M-18, Welded Steel Construction, (Metal Arc Welding)

.3 National Research Council Canada (NRC)
- .3 National Building Code of Canada (NBC) - 2015.
- .4 Ontario Building Code (OBC) 2016

1.5 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00- SUBMITTAL PROCEDURES and 05 50 00 METAL FABRICATIONS.

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for handrails and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit manufacturer’s installation instructions with project specific annotations to suit project conditions.

.3 Shop Drawings:
- .1 Submit shop drawings stamped and signed by professional engineer registered or licensed in Province of Ontario.
  - .1 Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.
  - .2 Indicate installation of handrails including but not limited to plans, elevations, sections, details of components, anchorage details and clearances to adjacent assemblies. Indicate critical field dimensions and conflicts.
  - .3 Indicate installation conditions at obstructions or at junction with adjacent construction as necessary to provide continuity of protection.

1.6 QUALITY ASSURANCE

.1 Perform welding to CSA W59 by a certified welder.
- .1 Ensure welding process is compatible with the hot-dip galvanization process without undue accumulation of galvanizing compound.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements:

- .1 Deliver products to site in original factory packaging, labelled with manufacturer's name and address, and list of contents of each package.

.2 Inspect products for any damage or deformation. Remove damaged products from site and replace with matching undamaged products.

.3 Check package contents list against submitted parts list to ensure all components necessary for a complete installation have been delivered.

.3 Storage and Handling Requirements:

.1 Store materials in dry location off ground indoors and in accordance with manufacturer's recommendations in clean, dry, well- ventilated area.

.1 Avoid wet storage stains from improper storing or packaging

.2 Store and protect handrail from all damage.

.3 Protect finish from nicks, scratches, and blemishes.

.4 Replace defective or damaged materials with new.

.4 Construction and packaging waste management: in accordance with Section 01 74 21- Construction/Demolition Waste Management and Disposal.

PART 2 - PRODUCT

2.1 STEEL HANDRAIL SYSTEM

.1 Rails and Posts: square steel tubing as detailed on Contract drawings and PCA guardrail standards.

.2 Mounting: adjustable brackets and flanges, with steel plates for mounting to steel members and concrete.

.3 Steel sections and plates: to CSA G40.20/G40.21, Grade 350W.

.4 Bolts: to ASTM F3125/F3125M unless otherwise specified.

.5 Anchor Bolts: to AISI 304 Stainless Steel, complete with epoxy injected adhesive unless otherwise specified.

.6 Splice Connectors: steel welding collars.

.7 Galvanization System – Section 09 97 01 – Painting Steel Surfaces.

2.2 FABRICATION

.1 Fit and shop assemble components in largest practical sizes for delivery to site.

.2 Fabricate components with joints tightly fitted and secured. Provide spigots and sleeves to accommodate site assembly and installation.

.3 Provide anchors bolts, plates, angles required for connecting railings to structure.

.4 Provide suitable drainage holes during the galvanizing process to allow flushing of fabricated pieces.

.5 Exposed Mechanical Fastenings: flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- .1 Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.
- .2 Continuously seal joined pieces by intermittent welds and plastic filler continuous welds. Drill condensate drainage holes at bottom of members at locations that will not encourage water intrusion.
- .3 Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- .4 Accurately assemble components to each other and to building structure as per Shop drawings.
- .5 Accommodate for expansion and contraction of members and structure movement without damage to connections or members.

.6 Complete assembled section is to be hot-dip galvanised after assembly and fabrication as per Section 09 97 01 – PAINTING STEEL SURFACES

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for handrail installation in accordance with manufacturer's written instructions.
- .1 Visually inspect substrate in presence of Departmental Representative.
- .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied and

after receipt of written approval to proceed from Departmental Representative.

3.2 PREPARATION

.1 Supply items required to be cast into concrete with setting templates, to appropriate locations.

3.3 INSTALLATION

.1 Install picket type handrails in accordance with shop drawings.

.2 Install components plumb and level, in proper alignment with adjacent assemblies.
.1 On inclined surfaces, posts and pickets are to be vertical.

.3 Anchor railing to structure with anchors bolts at concrete and structural bolts at steel members including all plates and angles.

.4 Conceal bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

.5 Assemble with spigots, sleeves and set-screws to produce secure, vibration-resistant installation

3.4 ERECTION TOLERANCES

.1 Maximum Variation from Plumb: 6 mm

.2 Maximum Out-of-Position: 6 mm

3.5 CLEANING

.1 clean in accordance with Section 01 74 11- Cleaning.

3.6 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by hand rail installation.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED WORK

.1 Section 05 50 00 – METAL FABRICATIONS

.2 Section 05 52 16 – HANDRAILS.

1.2 REFERENCES

.1 American Standard for Testing and Materials (ASTM):
- .1 ASTM A123/A123M-17, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- .2 ASTM A153/A153M-16a, Standard Specification for Zinc (Hot-Dip Galvanized) Coating on Iron and Steel Hardware.
- .3 ASTM A384/A384M-07(2019), Standard Practice for Safeguarding Against Warpage and Distortion during Hot-Dip Galvanizing of Steel Assemblies.
- .4 ASTM A385/A385M-20, Standard Practice for Providing High- Quality Zinc Coating (Hot-Dip).
- .5 ASTM A780/A780M–09(2015), Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.

.2 CSA International
- .1 CSA S16-19, Design of Steel Structures.
- .2 CSA G164-18, Hot Dip Galvanizing of Irregularly Shaped Articles.

.3 Canadian General Standards Board (CGSB).
- .1 CAN/CGSB-85.10-99, Protective Coatings for Metals.

.4 Society for Protective Coatings (Formerly known as Steel Structures Painting Council, SSPC):
- .1 Surface preparation standards:
  - .1 SSPC SP 1-15 Solvent Cleaning.
  - .2 SSPC SP 2-18 Hand Tool Cleaning.
  - .3 SSPC SP 3-18 Power Tool Cleaning.
  - .4 SSPC SP 6-07 Commercial Blast Cleaning.
  - .5 SSPC SP 10-07 Near-White Metal Blast Cleaning.
  - .6 SSPC SP 11-12 Power Tool Cleaning to Bare Metal.
- .2 Standards for visual inspection of surface preparation:
  - .1 SSPC Vis 1-02 Guide and Reference Photographs for Steel Surfaces Prepared by Dry Abrasive Blast Cleaning.
  - .2 SSPC Vis 3-04 Visual Standard for Power- and Hand-Tool Cleaned Steel

.3 SSPC PA 2-15, Procedure for Determining Conformance to Dry Coating Thickness Requirements.
.4 SSPC AB 1-15 Mineral and Slag Abrasives.
.5 SSPC AB 2-15 Cleanliness of Recycled Ferrous Metallic Abrasive
.6 SSPC AB 3-17 Ferrous Metallic Abrasive

.5 Color Chips Standard:
.1 SAE AMS STD 595A-17, Colors Used in Government Procurement.

.6 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
.1 Safety Data Sheets (SDS).

.7 The Master Painters Institute (MPI):
.1 Architectural Painting Specification Manual.
.2 Maintenance Repainting Manual.

.8 Manufacturer's current product data sheets: to be used in conjunction with and form part of this specification.

1.3 MEASURMENT AND PAYMENT

.1 Payments related to this Section shall be as set out in Section 01 22 01 – MEASUREMENT AND PAYMENT.

1.4 SUBMITTALS

.1 At least four (4) weeks prior to beginning Work, Submit in accordance with Sections 01 33 00 - SUBMITTAL PROCEDURES and 05 50 00 – METAL FABRICATIONS.

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for painting and galvanizing exterior metal surfaces and including product characteristics, performance criteria, finish and limitations.
.2 Submit manufacturer's instructions, printed product literature and data sheets for protective coating for machined surface.
.3 Submit colour chips for all paints for color selection by the Departmental Representative, before purchase.
.4 Submit colour chips for all paints for color selection by the Departmental Representative, before purchase.
.5 Submit certification that the abrasive blast media meets the material requirements.
.6 At project completion provide the Departmental Representative an itemized list complete with

manufacturer, paint type and color coding for all colors used.

.7 Submit qualifications of 3rd party coating inspector.

.3 Test Reports:

.1 Submit test reports showing compliance with specified performance characteristics and physical properties and in accordance with Section 01 45 00 – QUALITY ASSURANCE AND QUALITY CONTROL.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, store, and handle materials in accordance with manufacturer's written instructions.

1.6 QUALITY CONTROL

.1 Perform quality control procedures to Section 01 45 00 – QUALITY ASSURANCE AND QUALITY CONTROL.

.2 Hire third party NACE CIP level 2 inspector to inspect surfaces and paint and galvanisation application.

.3 Inspect each coat after application and before next coat is applied.

.1 Acceptance criteria:

.1 Correct type and colour of paint.

.2 Correct wet and dry film thickness.

.3 Coating is free from gross defects such as (but not limited to) holidays, pinholes, bubbles, runs, skips, drops, ridges, waves, laps, mudcracking, excessive or unsightly brush marks, and variations in colour, texture, and gloss.

.4 Inspect edges, corners, crevices, seams, joints, welds, corrosion pits, and other such surface irregularities to ensure they have received special attention in providing adequate thickness of paint and quality of application.

.4 Provide written documentation of measurements to Departmental Representative. Measurements include:

.1 Air and Steel Surface Temperatures.

.2 Humidity.

.3 Dew point.

.4 Surface profile of blasted steel.

.5 Dry film thickness.

.1 Measurements to be taken using approved type 2 magnetic gauges.

.2 Use and calibrate magnetic gauge according to SSPC-PA-02.

.5 Record all coating products used including batch numbers.

.6 Pay costs of correcting defects requested by Departmental Representative. This may include, removal of defective paint, re-cleaning of surfaces, and re-painting in accordance with these specifications.

.7 For each coat, wait to apply subsequent coats until dry painted surface is accepted by Departmental Representative or wet on wet approved by Departmental Representative.

.8 Perform low-voltage holiday test on 10% of coated surfaces after final coating application. Holiday testing to be performed as per NACE SP0188-2016 Discontinuity (Holiday) Testing of New Protective Coatings on Conductive Substrates. If significant holidays are found, larger testing area than 10% may be required to further evaluate coating.

.9 Take responsibility for delays due to surfaces or coatings being rejected.

1.7 QUALIFICATIONS

.1 Paint applicator to have minimum of five years proven satisfactory experience.
- .1 Provide list of last three comparable jobs
- .2 Qualified journeyperson as defined by local jurisdiction to be engaged in painting work.
- .3 Apprentices may be employed provided they work under direct supervision of qualified journeyperson.
- .4 Submit resume and certificates demonstrating level of experience for each journeyperson and apprentice.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Painting system used must meet air pollution regulations with VOC levels of 350 g/L or less.

.2 PAINT SYSTEM 1: IMMERSION SURFACES
- .1 Immersion surfaces defined as surfaces below high water line. Transition between above and below water are to be confirmed by contract administrator
- .2 Primer and Stripe Coats:
  - .1 Primer: Self-priming 100% solids epoxy lining paint.

.2 Stripe coat: Angles, corners and potential low film build areas with above product.
.3 Colour: to be distinct from topcoat to allow for easy identification from topcoat.
.4 Application: Wet on wet, multi-pass spray application recommended.
.5 Dry film thickness: minimum 12 mils, and to manufacturer’s recommendation.

.3 Second Coat:
.1 Second Coat: Self-priming 100% solids epoxy lining paint.
.2 Stripe coat: Angles, corners and potential low film build areas with above product.
.3 Colour: Colour match to corresponding component on existing dam.
.4 Wet on wet, multi-pass spray application recommended.
.5 Dry film thickness: minimum 12 mils, and to manufacturer's recommendation.

.4 Apply UV protection to any surfaces within 50 cm of minimum water elevation

.5 Other systems may be acceptable if they meet criteria above and are compatible. Components used in individual paint systems must be products of single manufacturer.
.1 Submit alternatives in accordance with Section 01 33 00 – SUBMITTAL PROCEDURES.

.3 PAINT SYSTEM 2: ABOVE WATER SURFACES
.1 Above-water surfaces defined as all surfaces exposed to air and include down to just below lowest water level. Transition locations between above and below water are to be confirmed by contract administrator.
.2 Primer and Stripe Coats:
.1 Primer: Self-priming 100% solids epoxy lining paint.
.2 Stripe Coat: Angles, corners, and potential low film build areas with above product.
.3 Colour: to be distinct from second coat to allow for easy identification.
.4 Application: Wet on wet, multi-pass spray application recommended.
.5 Dry film thickness: minimum 12 mils, and to manufacturer's recommendation.

.3 Second Coat:
.1 Second Coat: Self-priming 100% solids epoxy lining paint.
.2 Stripe Coat: Angles, corners, and potential low film build areas with above product.
.3 Colour: Colour match to corresponding component of existing dam.
.4 Application: Wet on wet, multi-pass spray application recommended.

.5 Dry film thickness: minimum 12 mils, and to manufacturer's recommendation.

.4 Topcoat:

.1 Topcoat: Aliphatic Urethane/Polyurethane Gloss Enamel paint.

.2 Dry film thickness: 2 to 3 mils, and to manufacturer's recommendation.

.3 Colour: Colour match to corresponding component of existing dam.

.5 Appl UV protection

.6 Other systems may be acceptable if they meet criteria above and are compatible. Components used in individual paint systems must be products of single manufacturer.

.1 Submit alternatives in accordance with Section 01 33 00 – SUBMITTAL PROCEDURES.

.4 Colour:

.1 Primer/first coat to be distinct from topcoat to allow for easy identification.

.2 Exact colours to match existing components. Coordinate colour match with Departmental Representative.

.5 Grit Blast Cleaning Abrasive in shop: To SSPC-AB-1, Mineral and Slag Abrasives, or SSPC-AB-3 Ferrous Metallic Abrasive. Non-silica, angular abrasive capable of producing surface profile, of 3 mils minimum and to give angular anchor tooth pattern.

2.2 SHOP PAINTING

.1 Do shop painting after fabrication and before any damage to surface occurs from weather or other exposure.

.2 Clean, prepare surfaces, and shop prime steel in accordance with CSA S16.

.3 Remove weld splatter before painting.

.4 Clean members, remove loose mill scale, rust, oil, dirt, and foreign matter.

.5 Prepare surfaces by abrasive grit blasting according to NACE No.2/SSPC-SP-10 Near-White Metal Blast Cleaning. If applicable, any weldable pre-primer must be removed by abrasive grit blasting.

.6 Apply epoxy primer in shop to steel surfaces to achieve minimum dry film thickness of 24 mils (2 coats at 12 mils each), except to the following surfaces unless directed otherwise:

.1 Surfaces to be encased in or in constant contact with concrete.

.2 Surfaces to receive field installed stud shear connections.
.3 Surfaces and edges to be field welded.
.4 Faying surfaces of slip-critical connections.
.5 Below grade surfaces in contact with soil.

.7 Apply paint under cover, on dry surfaces when surface and air temperatures are above 10°C.

.8 Maintain dry condition and 10°C minimum temperature until paint is thoroughly dry.

.9 Strip paint from bolts, nuts, sharp edges, and corners before prime coat is dry, as directed by Departmental Representative.

.10 Spray paint contact surfaces of field assembled, bolted, friction type joints with primer coat only. Do not brush primer after spraying.

.11 Protect machine finished or similar surfaces that are not to be painted but that do require protection, with coating of rust inhibitive petroleum, molydenum disulphide, or other coating approved by Departmental Representative.

.12 Copy previous erection marks and weight marks on areas that have been shop painted.

2.3 MIXING AND TINTING

.1 Perform colour tinting operations prior to delivery of paint to site.

.2 Do not use kerosene or other organic solvents to thin water-based paints.

.3 Re-mix paint in containers prior to and during application. Ensure break-up of lumps, complete dispersion of steeled pigment, and colour and gloss uniformity.

PART 3 - EXECUTION

3.1 GENERAL

.1 Carry out all surface preparation and painting in the shop.

.2 Touch-up at the site any area damaged during handling, transportation, and erection.

3.2 PAINTING PREPARATION

.1 Wash steel areas to be painted in accordance with SSP SP1 solvent washing.

.2 Blast clean new metal surfaces and surfaces of existing metal being reused in accordance with Steel Structures Painting Council SSPC-SP-10 to near White Metal.

.3 Perform compressed air blotter test prior to painting.

.4 Compressed air to be free of water and oil before reaching nozzle.

.5 Remove traces of blast products from surfaces, pockets, and corners to be painted by brushing with clean brushes, by blowing with clean dry compressed air, or by vacuum cleaning.

.6 Do not apply paint until prepared surfaces have been accepted by Departmental Representative.

.7 Prior to commencing paint application degree of cleanliness of surfaces to be in accordance with SSPC-Vis 1.

.8 Protection of surfaces.
- .1 Protect surfaces not to be painted.
  - .1 Clean and restore damaged surfaces as directed by Departmental Representative.
- .2 Apply paint or pretreatment as soon as possible after surface has been cleaned and prior to deterioration of surface.
- .3 Clean surfaces again if rusting occurs after completion of surface preparation.
- .4 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil, and solvents prior to application of prime coat and between applications of remaining coats.
- .5 All sharp edges, steel burrs, and weld splatter to be removed by hand file or equivalent method.
- .6 Remove visible and non-visible contaminants from surface and apply paint immediately.
- .7 Protect cleaned and freshly painted surfaces from dust and flash rusting to approval of Departmental Representative.

.9 Mixing paint:
- .1 Do not dilute or thin paint for brush application; use as received from manufacturer.
- .2 Do not mix or keep paint in suspension by means of air bubbling through paint.

.3 Thin paint for spraying according to manufacturer's instructions. If directions are not on container, obtain instructions in writing from manufacturer and provide copy of instructions to Departmental Representative.
.1 Departmental Representative to approve paint thinning

3.3 PAINT APPLICATION

.1 Prior to commencing application of any coat obtain approval of Departmental Representative of prepared surface.

.2 Apply paint in accordance with manufacturer’s requirements unless specified otherwise.

.3 Apply primer/stripe coat quickly after acceptance of prepared surface to minimize flash rusting.

.4 Apply paint to areas prior to installation of equipment, accessories, or parts of gate which may cause difficulty in painting areas.
.1 Includes items such as cross brace.

.5 Apply stripe coat to angles, corners, crevices, welds, and potential low film build areas by brush, roller, or spray. Apply primer and topcoat to surfaces by spraying.

.6 Use dipping or roller coating method of application only when specifically authorized by Departmental Representative in writing.

.7 Caulk open seams at contact surfaces of built up members with material approved by Departmental Representative, before top coat is applied.

.8 Where surface approved to be painted not under cover, do not apply paint when:
.1 Air temperature is below 10°C or when temperature is expected to drop to 0°C before paint has dried.
.2 Temperature of surface is over 40°C.
.3 Fog or mist occur at site; it is raining or snowing; there is danger of rain or snow; relative humidity is above 80%.
.4 Surface to be painted is wet, damp, or frosted.
.5 Outside of recoat window in accordance with manufacturer’s data sheets.
.6 Steel temperature is less than 3°C above dewpoint.

.9 Provide cover when paint must be applied in damp or cold weather.

.1 Protect, shelter, or heat surface and surrounding air to comply with specified temperature and humidity conditions
.2 Protect until: minimum recoat time is reached, paint is dry, and weather conditions are accepted by Departmental Representative.

.10 Remove paint from areas which have been exposed to freezing, excess humidity, rain, snow, or condensation. Prepare surface again and repaint.

.11 Apply each coat of paint as continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.

.12 Spray application.
.1 Provide and maintain equipment that is suitable for intended purpose, capable of properly atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.
.2 Provide traps or separators to remove oil and water from compressed air and drain periodically during operations.
.3 Blotter tests to be performed at regular intervals to verify contaminants are not present. Provide Departmental Representative test results for review.
.4 Keep paint ingredients properly mixed in spray pots or containers during paint application either by continuous mechanical agitation or by intermittent agitation as frequently as necessary.
.5 Apply paint in uniform layer, with overlapping at edges of spray pattern.
.6 Brush out immediately runs and sags.
.7 Use brushes to work paint into cracks, crevices, and places which are not adequately painted by spray. In areas not accessible to spray gun, use brushes, daubers, or sheepskins.
.8 Remove runs, sags, and brush marks from finished work and repaint.

.13 Handling painted metal.
.1 Do not handle painted metal until paint has dried, except for necessary handling for painting or stacking for drying.
.2 Scrape off and touch up paint which is damaged in handling, with same number of coats and kinds of paint as were previously applied to metal.

3.4 GALVANIZING

.1 Surface preparation:
.1 Clean all surfaces to be galvanised from all traces of oil, grease or other contaminant with

solvent in conformity with SSPC SP1 Standard, then acid treat it in conformity of SSPC SP8 Standard.

.2 Remove weld spatter and smooth by grinding rough welds and sharp edges.

1. Ensure all welds are compatible with hot galvanizing process to avoid undue galvanization build up at weld.

.3 All surfaces must be dry, exempt of oil, rust, grease, weld spatter, dirt, etc. before galvanisation.

.2 Galvanizing

.1 Galvanizing to be performed in conformity to CSA G164, ASTM A384/A384M and ASTM A385/A385M Standards and to the requirements of the present specification.

.2 No other fabrication is allowed after galvanizing.

.3 Surfaces must be smooth and clean.

.4 Zinc coat must be even and its thickness must be such that the minimum weight of the zinc coat is not less than 610 gr. /m² for all other elements.

.3 Inspection

.1 Inspect visually all surfaces after galvanizing to detect any defects and deficiencies.

.2 Check the Zinc thickness on each component or on representative samples.

.3 Measure Zinc thickness in conformity of one of the methods stipulated in CAN/CSA G164 Standard.

.4 Touch-ups

.1 Carry out touch-ups with cold galvanizing compound in conformity to ASTM A780/A780M Standard.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 This section specifies requirements for both permanent and temporary safety signage for public safety and navigation.

1.2 RELATED REQUIREMENTS

.1 Section 01 33 00 – Submittal Procedures

.2 Section 01 41 00 - Regulatory Requirements

.3 Section 01 74 20 - Construction / Demolition Waste Management and Disposal

1.3 MEASUREMENT AND PAYMENT PROCEDURES

.1 Payment shall be made as set out in Section 01 22 01 – Measurement and Payment and shall be included in the applicable item of work for signage.

1.4 REFERENCE STANDARDS

.1 Canadian Dam Association (CDA)
  .1 Signage for Public Safety around Dams.

.2 Parks Canada Agency Safety sign standards.

.3 American Association of State Highway and Transportation Officials (AASHTO)
  .1 AASHTO LRFDLTS-1-15 including 2020 Interim Revisions, Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals (5th Edition).

.4 American Architectural Manufacturers Association (AAMA)
  .1 AAMA 2605-19, Guide for Use and Selection of Powder Coating Systems for Protective Purposes.

.5 ASTM International
  .1 ASTM A36/A36M-19, Standard Specification for Carbon Structural Steel.
  .2 ASTM A123/A123M-17, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
  .3 ASTM A276/A276M-16, Standard Specification for Stainless Steel Bars and Shapes.

.4 ASTM B209M-14, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric].
.5 ASTM B210/B210M-19a, Standard Specification for Aluminum-Alloy Drawn Seamless Tubes.
.6 ASTM B211M-19, Standard Specification for Aluminum and Aluminum-Alloy Bar, Rod and Wire.
.7 ASTM D2244-16, Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates.
.8 ASTM D523-14 (2018), Standard Test Method for Specular Gloss.
.9 ASTM F3125/F1325M-19, Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength.

.6 Canadian General Standards Board (CGSB)
.1 CGSB 62-GP-9M-80, Prefabricated Markings, Positionable, Exterior, for Aircraft Ground Equipment and Facilities.
.2 CGSB 62-GP-11M-78, Marking Material, Retroreflective, Enclosed Lens, Adhesive Backing and Amendment.

.7 CSA International
.1 CSA G40.20/G40.21-13 (2018), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
.2 CSA O80 SERIES-15 (2019), Wood Preservation.
.3 CSA O121-17, Douglas fir plywood.
.4 CSA W47.2-11 (2015), Certification of Companies for Fusion Welding of Aluminum.
.5 CSA Z809-08, Sustainable forest management.

.8 Green Seal Environmental Standards (GS)
.1 GS-11-15, Paints and Coatings.

.9 The Master Painters Institute (MPI)
.1 Architectural Painting Specification Manual - 2020 edition.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for traffic signage, including product characteristics,

performance criteria, physical size, finish and limitations.

.3 Shop Drawings:
.1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario to Section 01 33 00 - Submittal Procedures.
.2 Indicate items as follows:
.1 Sign supporting structures
.2 Mounting requirements

1.6 DELIVERY, STORAGE AND HANDLING

.1 Undertake a pre-condition assessment of existing signage. Salvage existing signage as identified by the Departmental Representative. Replace damaged signage to the requirements specified herein. Salvage existing safety signage and store for reuse.

.2 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

.3 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.4 Packaging Waste Management: remove for recycling and reuse of pallets, padding, packaging materials, crates as specified in Waste Reduction Workplan in accordance with Section 01 74 21 - Construction/ Demolition Waste Management and Disposal.

.5 Storage and Handling Requirements:
.1 Store materials indoors in dry location off ground and in accordance with manufacturer's recommendations in clean, dry, well- ventilated area.
.2 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 DESIGN CRITERIA

.1 Sign supports to be capable of withstanding the combination of following loads:
.1 Wind loads in any direction of 1.7 kPa on signboards and on sign supports

.2 Structural deflections and vibration in accordance with American Association of State Highway and Transportation Officials (AASHTO LRFDLTS-1), "Standard

Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals".

2.2 MATERIALS

.1 Temporary sign supports:
  .1 Sawn timber posts:
    .1 Species: SPF
    .2 Type: pressure treated CSA O80 SERIES-15
    .3 Grade and Dimensions: to contractor's specifications

.2 Permanent Sign Supports:
  .1 Steel posts and base:
    .1 Material: to CSA G40.20/G40.21
    .2 Anchors and Connecting Bolts: threaded 'U' clamps and miscellaneous hardware to ASTM A36/A36M.
    .3 Bolts: to ASTM F3125/F3125M.
    .4 Galvanization: to ASTM A123/A123M

.3 Fasteners: bolts, nuts, washers and other hardware for signs to be galvanized steel

.4 Temporary Signboards
  .1 Plywood: to CSA O121, 19 mm thick.
  .2 Overlaid Douglas Fir, Medium Density CSA Z809, FSC certified, overlaid one side only with fibre or plastic sheet surfacing material.
  .3 Primer for plywood: to MPI #5 VOC limi of 350 g/L to SCAQMD Rule 1113.

.5 Permanent Signboards
  .1 Refer to Parks Canada Agency Standards
  .2 Aluminum sheet: to ASTM B209M, 3 mm thick sheets precut to required dimensions.
  .3 Aluminum extrusions: 300 mm standard highway extruded panels (shape #73247) using aluminum alloy AA 6061-T5 or AA 6006-T5. Extruded panels to be supplie with all mounted hardware as required for proper assembly and installation.
  .4 T-shape stiffeners for signboards: to ASTM B210/B210M.
  .5 Connecting straps and brackets: to AST B209M.
  .6 Aluminum materials: to ASTM B209M.
  .7 Primer for aluminum: to MPI #8, VOC limit of GS-11 250 g/L.
  .8 Reflective sheeting and tape: to CGSB 62-GP-11M. Adhesive, class of reflectivity and colour as indicated.
    .1 All adhesive sheeting shall be cut using a computer controlled cutting system.

2.3 FABRICATION

.1 Supports:
  .1 Connect aluminum support members by welding in accordance with CSA W47.2. Work to be performed by Canadian Welding Bureau qualified members only. Flame cutting of members not permitted.
  .2 Welds to be of same strength as adjacent member or casting.
  .3 Reinforce in area of electrical hand holes t equal strength of full section member.
  .4 Remove sharp edges and burrs.

.2 Signboards:

  .1 Plywood blanks:
    .1 Cut plywood blanks to required shape and dimensions. Fill edges with wood filler suitable for outdoor use and sand smooth.
    .2 Lightly sand surfaces, wipe clean with xylene thinner and allow to dry for 8 hours.
    .3 Spray signboard back and edges with one prime coat maximum VOC content 350 SCAQMD Rule 1113 GS-11 and two white finish coats in the same colour as the sign face.

  .3 Aluminum blanks:
    .1 Pre-drilled for installation, finish and ensure all exposed edges and corners are de-burred and made smooth.
    .2 Degrease, etch and bonderize with chemical conversion coating.
    .3 Clean surfaces with xylene thinner. Dry.
    .4 Pre-treatment of aluminum panels are to be in accordance to the pre-treatment manufacturer's specifications. Pre- treatment to meet AAMA 2605 (American Architectural Manufacturers Association).
    .5 Power coating of sign surfaces:
      .1 Electrostatic applied high performance architectural grade retro-reflective fluoropolymer based powder system meeting AAMA 2605;
        1. Minimum warranty period of 10 years;
        2. Maximum change of 5 Hunter units of Colour Integrity ASTM D2244;
        3. Minimum Gloss Retention of 50% ASTM D523.
      .2 Powder coating to provide 100% coverage with a film thickness of 3 to 3.5 mil with 30 degrees of gloss and free of mechanical defects.
    .6 Reflective background sheeting and lettering:

.1 Cut and apply in accordance with manufacturer's instructions.
.2 Apply adhesive coated material with heat lamp vacuum applicator or by squeeze roll application method. Apply pressure sensitive material with roller or squeegee.
.3 Edge wrap sheeting on each extrusion prior to bolting extrusions. Match pieces of sheeting from different rolls for each signboard to ensure uniform appearance and brilliance by day and night.

.4 Non-reflective lettering and symbols: cut from vinyl film as specified in CGSB 62-GP-9M, or paint using required colour of finish paint maximum VOC of 350 g/L GS-11 or silk screen transparent ink.

.5 Clean signboards completely and apply transparent tape over top edge and extending

.6 25 mm minimum down back and front of signboard.

.7 Protect finished signboard faces with one coat of clear varnish with maximum VOC limit of 350 g/L.

.8 Sign identification:

.1 Apply sign number and date of installation with 25 mm high stencil painted black letters on lower left back face of each signboard.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Sign support:
.1 Erect supports as indicated. Permissible tolerance: 50 mm maximum departure from vertical for direct buried supports. Where separate concrete footings have been placed, erect posts with base plates resting on levelling nuts and restrained with nuts and washers. Permissible tolerance: 12 mm maximum departure from vertical.
.2 Coat underside of base plate with corrosion protective paint before installation. Connect shoe base to shaft with inside and outside fillet welds.
.3 Close open aluminum tubes and posts with aluminum cap. Cut oblong holes in shoe bases to drain condensation. Install aluminum bolt cover on each base plate restraining nut.

.4 Erect posts plumb and square to details as indicated.

.2 Signboard:
.1 Fasten signboard to supporting posts and brackets as indicated.
.2 Fasten lane markers to signboard.
.3 Use strapping with crimped or bolted connections where signs fastened to utility poles.
.4 Use T-shape aluminum stiffeners to join portions of sign panel on site. Cover face of T-stiffener with material identical to face of sign panel.

.3 Traffic Signage:
.1 Install signage to the requirements of the local authority. As a minimum, install to the same conditions of the original signage.

3.2 CORRECTING DEFECTS

.1 Correct defects, identified by Departmental Representative, in sign message, consistency of reflectivity, colour or illumination. Correct angle of signboard and adjust luminaire aiming angle for optimum performance during night conditions to approval of Departmental Representative.

3.3 CLEANING

.1 Clean in accordance with Section 01 74 11- CLEANING.

3.4 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by traffic signage installation and salvage operations.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 31 23 33.01 - Excavation, Trenching and Backfilling

1.2 REFERENCE STANDARDS

.1 ASTM International
  .1 ASTM D4791-19, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.

.2 Ontario Provincial Standard Specifications (OPSS)
  .1 OPSS.PROV 1001, November 2018 – Material Specification for Aggregate – General
  .2 OPSS.MUNI 1010, November 2013 – Material Specification for Aggregate
  .3 OPSS.PROV 1004, November 2012 – Material Specification for Aggregate

1.3 1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:
  .1 Submit manufacturer's instructions, printed product literature and data sheets for aggregate materials and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Samples:
  .1 Submit 3 samples.
  .2 Allow continual sampling by Departmental Representative during production.
  .3 Provide Departmental Representative with access to source and processed material for sampling.
  .4 Supply new or clean sample bags or containers according appropriate to aggregate materials.
    .1 Pay cost of sampling and testing of aggregates which fail to meet specified requirements.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Transportation and Handling: handle and transport aggregates to avoid segregation, contamination and degradation.

.3 Storage: store washed materials or materials excavated from underwater 24 hours minimum to allow free water to drain and for materials to attain uniform water content.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Apparent aggregate such as parking and permanent access surface, pedestrian path and rip-rap protection must be granite, locally source if possible.

.2 Aggregate quality: sound, hard, durable material free from soft, thin, elongated or laminated particles, organic material, clay lumps or minerals, free from adherent coatings and injurious amounts of disintegrated pieces or other deleterious substances.

.3 Flat and elongated particles of coarse aggregate: to ASTM D4791.
.1 Greatest dimension to exceed 5 times least dimension.

.4 Fine aggregates satisfying requirements of applicable section to be one, or blend of following:
.1 Screenings produced in crushing of quarried rock, boulders, and gravel.
.2 No slag, or reclaimed pavement will be accepted.

.5 Coarse aggregates satisfying requirements of applicable section to be one of or blend of following:
.1 Crushed rock.
.2 Gravel and crushed gravel composed of naturally formed particles of stone.
.3 No slag, or reclaimed pavement will be accepted.

.6 Clear stone aggregate satisfying requirements of applicable section to be one of or blend of following, exempt of fines:
.1 Crushed rock.
.2 Gravel and crushed gravel composed of naturally formed particles of stone.
.3 No slag, or reclaimed pavement will be accepted.

2.2 SOURCE QUALITY CONTROL

.1 Inform Departmental Representative of proposed source of aggregates and provide access for sampling 4 weeks minimum before starting production.

.2 If materials from proposed source do not meet, or cannot reasonably be processed to meet, specified requirements, locate alternative source.

.3 Advise Departmental Representative four (4) week minimum in advance of proposed change of material source.

.4 Acceptance of material at source does not preclude future rejection if it fails to conform to requirements specified, lacks uniformity, or if its field performance is found to be unsatisfactory.

PART 3 - EXECUTION

3.1 PREPARATION

.1 Aggregate source preparation:
- .1 Aggregate material is to be supplied from Ontario Ministry of Transportation approved source or alternative approved by Department Representative.
- .2 If requested by the Departmental Representative, submit Ontario Ministry of Transportation approval certificates/documentation of the proposed source of aggregates.
- .3 Prior to excavating materials for aggregate production, clear and grub area to be worked, and strip unsuitable surface materials. Dispose of cleared, grubbed and unsuitable materials as directed by Departmental Representative.
- .4 Where clearing is required, leave screen of trees between cleared area and roadways as directed.
- .5 Clear, grub and strip area ahead of quarrying or excavating operation sufficient to prevent contamination of aggregate by deleterious materials.
- .6 Trim off and dress slopes of waste material piles and leave site in neat condition.
- .7 Provide silt fence or other means to prevent contamination of existing watercourse or natural wetland features.

.2 Processing:
- .1 Process aggregate uniformly using methods that prevent contamination, segregation and degradation.
- .2 Blend aggregates, as required, in order to satisfy gradation requirements for material and, percentage of crushed particles, or particle shapes specified.
  - .1 Use methods and equipment approved in writing by Departmental Representative.

.3 When operating in stratified deposits use excavation equipment and methods that produce uniform, homogeneous aggregate gradation.

.4 Where necessary, screen, crush, wash, classify and process aggregates with suitable equipment to meet requirements.
- .1 Use only equipment approved in writing by Departmental Representative.

.5 Stockpiling:
- .1 Stockpile aggregates on site in locations as indicated unless directed otherwise by Departmental Representative. Do not stockpile on completed pavement surfaces. Do not stockpile at the top of bank of any shorelines or slopes.
- .2 Stockpile aggregates in sufficient quantities to meet project schedules.
- .3 Stockpiling sites to be level, well drained, and of adequate bearing capacity and stability to support stockpiled materials and handling equipment.
- .4 Except where stockpiled on acceptably stabilized areas, provide compacted sand base not less than 300 mm in depth to prevent contamination of aggregate. Stockpile aggregates on ground but do not incorporate bottom 300 mm of pile into Work.
- .5 Separate different aggregates by strong, full depth bulkheads, or stockpile far enough apart to prevent intermixing.
- .6 Do not use intermixed or contaminated materials. Remove and dispose of rejected materials as directed by Departmental Representative within 48 hours of rejection.
- .7 Stockpile materials in uniform layers of thickness as follows:
  - .1 Maximum 1.5 m for coarse aggregate and base course materials.
  - .2 Maximum 1.5 m for fine aggregate and sub-base materials.
  - .3 Maximum 1.5 m for other materials.
- .8 Uniformly spot-dump aggregates delivered to stockpile in trucks and build up stockpile as specified.
- .9 Do not cone piles or spill material over edges of piles.
- .10 Do not use conveying stackers.
- .11 During winter operations, prevent ice and snow from becoming mixed into stockpile or in material being removed from stockpile.

3.2 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11- Cleaning.
.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11- Cleaning.

.3 Leave aggregate stockpile site in tidy, well drained condition, free of standing surface water.

.4 Leave any unused aggregates in neat compact stockpiles as directed by Departmental Representative.

.5 For temporary or permanent abandonment of aggregate source, restore source to condition meeting requirements of authority having jurisdiction.

.6 Restrict public access to temporary or permanently abandoned stockpiles by means acceptable to Departmental Representative.

END OF SECTION

PART 1 - GENERAL

1.1 DESCRIPTION

.1 This section specifies requirements for the clearing and grubbing of the work area as designated by the Departmental Representative.

1.2 RELATED REQUIREMENTS

.1 Section 31 23 33.01 – Excavation, Trenching and Backfilling

.2 Section 31 14 13 - Soil Stripping and Stockpiling

.3 Section 32 01 90.33 - Tree and Shrub Preservation

.4 Section 32 93 43.01 - Tree Pruning

.5 Section 32 93 10 - Trees, Shrubs and Ground Cover Planting

1.3 MEASURMENT AND PAYMENT PROCEDURES

.1 No separate measurement for payment shall be made for items under this section. Include cost in the contract Lump Sum Amount.

.2 Payments related to this Section shall be as set out in Section 01 22 01 – Measurement and Payment.

1.4 REFERENCE STANDARDS

.1 U.S. Environmental Protection Agency (EPA)/Office of Water
  .1 EPA 832-R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

.2 Ontario Provincial Standard Specifications (OPSS)
  .1 OPSS.PROV 180, November 2016, General Specification for the Management of Excess Materials.
  .2 OPSS.PROV 201 April 2019, Construction Specifications for Cleaning, Close Cut Clearing, Grubbing, and Removal of Surface and Piled Boulders.
  .3 OPSS.PROV 805, November 2018, Temporary Erosion and Sediment Control Measures.

.3 Stormwater Management Planning and Design Manual, Ontario Ministry of Environment (March 2003).

.4 Erosion & Sediment Control Guideline for Urban Construction (December 2006).

.5 Provincial and Federal acts
.1 Federal Species at Risk Act (SARA), S.C. 2002, c. 29.
.2 Ontario Endangered Species Act (ESA), S.O. 2007, c. 6.

1.5 ACTION AND INFORMATION SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Prepare and submit a Tree Protection Plan in accordance with Section 32 01 90.33

.3 Submit 1 sample of each material listed below for approval prior to delivery of materials to project site.
.1 Tree wound paint: one liter can with manufacturer's label.

.4 Submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.5 Submit manufacturer's installation instructions

1.6 DEFINITIONS

.1 Clearing consists of cutting, felling and trimming of trees, brush and vegetative growth to not more than specified height above ground into sections and satisfactorily disposing of vegetation designated for removal, including downed timber, snags, brush and rubbish as well as previously uprooted trees and stumps, and surface debris occurring within areas designated for clearing.

.2 Close-cut clearing consists of cutting off standing trees, brush, scrub, roots, stumps and embedded logs, removing at, or close to, existing grade and disposing of fallen timber and surface debris.

.3 Clearing isolated trees consists of cutting off to not more than specified height above ground of designated trees, and disposing of felled trees and debris.

.4 Underbrush clearing consists of removal from treed areas of undergrowth, deadwood, and trees smaller than

50 mm trunk diameter and disposing of fallen timber and surface debris.

.5 Grubbing consists of excavation and disposal of stumps, roots, boulders and rock fragments of specified size to not less than specified depth below existing ground surface.

.6 Pruning consists of the removal of tree lims and branches by qualified arborist to maintain a healthy tree

.7 EAB refers to Emerald Ash Borer a non-native, invasive beetle that is highly destructive to ash trees where it occurs.

.1 Woodchips in the context of EAB consist of untreated, raw bark and wood fragments broken or shredded from logs or branches. Woodchips are to be less than 2.5 cm in at least any two dimensions.

.2 Firewood in the context of EAB consists of non-manufactured, solid wood material, with or without bark, cut into sizes less than 1.2 metres long and less than 25 cm in diameter which may be handled manually.

.3 Logs in the context of EAB consist of untreated, raw wood greater than 1.2 metres in length and greater than 25 cm diameter.

.4 Enclosed vehicle in the context of EAB consist of any vehicle transporting regulated wood material that is equipped to prelude the loss of materials or the escape of EAB while in transit.

.8 Tree and Plant Protection Area: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction, and defined by a circle centered on the trunk with each tree with a radius equal to the crown dripline unless otherwise indicated by the Departmental Representative.

1.7 HEALTH AND SAFETY

.1 Do construction occupational health and safety in accordance with the Ontario Occupational Health and Safety Act and section 01 35 29.06.

.2 Safety Requirements: worker protection.

.1 Workers must wear gloves, respirators dust masks, long sleeved clothing, eye protection protective clothing.

.2 Workers must not eat, drink or smoke while applying herbicide material.

.3 Clean up spills of preservative materials immediately with absorbent material and safely discard to landfill.

1.8 STORAGE AND PROTECTION

.1 Prevent damage to root systems of trees, landscaping, water courses, trees, shrubs, bench marks, utility lines, fencing and natural features which are to remain.
.1 Repair damaged items to approval of Departmental Representative.
.2 Replace trees designated to remain, if damaged, as directed by Departmental Representative.
.3 Isolate areas to be undisturbed with appropriate perimeter controls (i.e. sediment fencing, perimeter fencing, snow fences etc.).

.2 Protect vegetation not identified for clearing from damage.
.1 Protect roots of trees to remain to dripline during excavation to prevent disturbance or damage.
.2 Avoid unnecessary traffic, dumping and storage of materials over root zones.
.3 Protect adjacent paving, soil, trees, shrubs, ground cover plantings and understory plants to remain from damage during all tree removal operations, and from construction operations. Protection shall include the root system, trunk, limbs and crown from breakage or scarring, and the soil from compaction.
.4 Reduce soil displacement and compaction by using equipment of low bearing weight and low pressure tires wherever possible. Replace damaged areas to pre-construction state with topsoil and vegetation.

1.9 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 – CONSTRUCTION/DEMOLITION WASTE MANAGEMENT AND DISPOSAL.

.2 All slash left from felling and clearing is to chipped and stockpiled on site in a location as direction by the Departmental Representative

.1 Felled timber is to be used for fuel wood.

.1 Trim limbs and tops, and saw into logs into lengths 2.4m for fuel wood.
.2 Stockpile adjacent to site in a location as directed by the Departmental Representative

.3 Replace any trees if damaged, as directed by Departmental Representative.

.4 Ash wood mixed with the wood of other species is to all be managed and disposed of as ash wood.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Herbicide: herbicide is not allowed on this project

.2 Soil Material for Fill:
.1 Excavated soil material: free of debris, roots, wood, scrap material, organic matter, refuse, soft unsound particles, deleterious, or objectionable materials.
.2 Remove soil material in accordance with OPSS.PROV 180, November 2016.

.3 Contractor not to re-use soil material for fill unless approved in writing by departmental representative.

.4 Contractor not to re-use excavated topsoil unless approved in writing by departmental representative.

.5 Contractor to provide justification for re-uses of materials. Departmental representative has final say in the re-use of excavated material.

PART 3 - EXECUTION

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water, runoff or airborne dust to adjacent watercourse, properties and walkways, according applicable requirements of local authorities having jurisdiction.

.2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.2 PREPARATION

.1 Inspect site and verify with Departmental Representative, items designated to remain.

.2 Locate and protect utility lines: preserve in operating condition active utilities traversing site.
- .1 Notify Departmental Representative immediately of damage to or when unknown existing utility lines are encountered.
- .2 Relocate utilities as needed
- .3 When utility lines which are to be removed are encountered within area of operations, notify Departmental Representative in ample time to minimize interruption of service.

.3 Notify utility authorities before starting clearing and grubbing.

.4 Keep roads and walks free of dirt and debris.

.5 Prior to the preconstruction meeting, layout the limits of the Tree and Plant Protection area, As shown on the drawings, and then alignments of required Tree and Plant Protection Fencing. Obtain the Departmental Representative's approval of the limits of the protection area and the alignment of all fencing.

.6 Flag all trees to be removed by wrapping orange plastic ribbon around the trunk and obtain the Departmental Representative's approval of all trees to be removed prior to the start of tree removal. After approval, mark all trees to be removed with orange paint in a band completely around the base of the tree 4.5 feet above the ground

3.3 APPLICATION

.1 Manufacturer's instructions: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.4 CLEARING

.1 Clearing includes felling, trimming, and cutting of trees into sections and satisfactory disposal of trees and other vegetation designated for removal, including downed timber, snags, brush, and rubbish occurring within cleared areas.

.2 Clear as indicated by Departmental Representative, by cutting at height of not more than 300 mm above ground. In areas to be subsequently grubbed, height of

stumps left from clearing operations to be not more than 1000 mm above ground surface.

.3 Cut off branches, by qualified arborist and cut down trees overhanging area cleared as directed by Departmental Representative.

.4 Cut off unsound branches by a qualified arborist, on trees designated to remain as directed by Departmental Representative.

.5 Remove vegetation from targeted areas by non- chemical means and dispose of stripped vegetation at location approved by Departmental Representative.

.6 Remove brush from targeted area by non-chemical means and dispose at a location approved by Departmental Representative.

3.5 CLOSE CUT CLEARING

.1 Close cut clearing to ground level.

.2 Cut trees and branches overhanging area cleared as directed by Departmental Representative.

.3 Cut off unsound branches on trees designated to remain as directed by Departmental Representative.

.4 Clear vegetation from unstable or erodible banks by hand, and where possible, avoid the use of heavy machinery. Operate machinery on land and in a manner that minimizes disturbance to the banks of the water body.

3.6 ISOLATED TREES

.1 Relocate isolated trees in accordance as with Section 32 01 90.33.

.2 Cut off isolated trees as indicated by Departmental Representative at height of not more than 300 mm above ground surface.

.3 Grub out isolated tree stumps.

.4 Prune individual trees, by qualified arborist, adjacent to the area which may be affected by the work under this contract.

.5 Trim trees designated to be left standing within cleared areas of dead branches 4 cm or more in diameter; and trim branches to heights as indicated.

.6 Cut limbs and branches to be trimmed close to bole of tree or main branches.

.7 Paint cuts more than 3 cm in diameter with approved tree wound paint.

3.7 UNDERBRUSH CLEARING

.1 Clear underbrush from areas as indicated at ground level.

.2 Clear vegetation from unstable or erodible banks by hand, and where possible, avoid the use of heavy machinery. Operate machinery on land and in a manner that minimizes disturbance to the banks of the water body.

3.8 GRUBBING

.1 Remove and dispose of roots larger than 7.5 cm in diameter, matted roots, and designated stumps from indicated grubbing areas.

.2 Grub out stumps and roots to not less than 200 mm below ground surface.

.3 Fill depressions made by grubbing with suitable material, to make new surface conform with existing adjacent surface of ground.

3.9 REMOVAL AND DISPOSAL

.1 Provide Department Representative with certificate of licensed waste receiving station for approval of receiving site. Alternate non-licensed locations may be considered subject to the contractor having a formal agreement with the related party.

.2 Remove cleared and grubbed materials not being retained for site restoration activities off of site to disposal area selected by the Contractor and approved by the Departmental Representative.

.3 Remove diseased trees identified by Departmental Representative and dispose of this material to approval of Departmental Representative.

.4 Brush and mulch piles must not be stored on site.

.5 Burning of cleared vegetation is not be permitted.

.6 Any ash wood materials or firewood which is removed from the site is to be transported in an enclosed vehicle and disposed of at an authorized disposal facility.

.7 The Contractor is responsible for monitoring all cut ash wood and firewood until it is properly disposed of as determined by Departmental Representative.

.8 Do not bury or burn disposal material on site.

3.10 FINISHED SURFACE

.1 Leave ground surface in condition suitable for stripping of topsoil and immediate grading operations to approval of Departmental Representative.

3.11 CLEANING

.1 Proceed in accordance with Section 01 74 11- Cleaning.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 This section specifies the environmentally responsible procedures for the stripping and preservation of topsoil.

1.2 RELATED REQUIREMENTS

.1 Section 31 11 00 – Clearing and Grubbing

.2 Section 31 22 13 – Rough Grading

.3 Section 01 35 43 – Environmental Procedures

.4 Section 32 91 20 – Topsoil Placement and Grading

.5 Section 32 92 23 - Sodding.

.6 Section 32 93 10 - Trees, Shrubs and Ground Cover Planting

1.3 REFERENCE STANDARDS

.1 Ontario Provincial Standard Specifications (OPSS)
  .1 OPSS.PROV 201, April 2019 - Construction Specification for Clearing, Close Cut Clearing, Grubbing and Removal of Surface and Piled Boulders.
  .2 OPSS.PROV 182, November 2012 - Environmental Protection for Construction in Waterbodies and on Waterbody Banks.
  .3 OPSS.PROV 805, November 2010 - Temporary Erosion and Sediment Control Measures.

.2 Stormwater Management Planning and Design manual, Ontario Ministry of Environment (March 2003).

.3 Erosion & Sediment Control Guideline for Urban Construction (December 2006)

PART 2 - PRODUCTS

2.1 NOT USED

PART 3 - EXECUTION

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties according to requirements of Erosion & Sediment Control Guideline for Urban Construction (December 2006) and sediment and erosion control drawings, whichever is more stringent.

.2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.2 STOCKPILING

.1 Stockpiling:
- .1 Select stockpile location to avoid slopes, natural drainage ways and traffic routes.
- .2 Stockpile stripped materials in area designated by the Departmental Representative.
- .3 Stockpile stripped material by mechanical hoe in berms at locations as designated by the Departmental Representative.
- .4 Implement erosion and sediment control measures such as sediment fence and temporary seeding in accordance with Section 01 35 43 ENVIRONMENTAL PROCEDURES to prevent sediment release beyond construction boundaries and into water bodies.
- .5 Stockpile shall not exceed 3 m in height, where topsoil will be stockpiled greater than 1.3 m in height for more than 6 months, the soil shall be amended with compost to reestablish healthy soil structure and restore soil organism populations.
- .6 Complete temporary stabilization of the stockpile within seven (7) days of the formation of the stockpile. Provide temporary seeding or proper cover if the stockpile remains dormant for longer than thirty (30) days.
- .7 Prior to regional breeding bird season (April 1st to August 31st), soil stockpiles should be made/maintained, so they are unsuitable for Bank Swallow nesting. This should be accomplished by reducing the stockpile slope to 70° or less or

grading and mechanically alterting the slopes on excavated extraction faces. This method has been consistently proven to be effective at deterring Bank Swallows from nesting.

.8 If fill is to be reused it can be placed back to its original location and capped with a minimum of 30 cm of clean topsoil.

.9 If any stockpiles are suspected to be contaminated based on visual signs or smells, consult Departmental Representative for instruction.

3.3 STRIPPING OF TOPSOIL

.1 Ensure that procedures are conducted in accordance with applicable Provincial Regulatory agencies and Municipal requirements.

.2 Remove topsoil before construction procedures commence to avoid compaction of topsoil.

.3 Remove vegetation from targeted areas by non- chemical means and dispose of stripped vegetation as approved by Departmental Representative.

.4 Remove brush from targeted area by non-chemical means and dispose as approved by Departmental Representative.

.5 Carry out clearing and grubbing work in accordance with Section 31 11 00.

.6 Strip topsoil. Avoid mixing topsoil with subsoil

.7 Dispose of unused topsoil off-site in approved location.

.8 Contractor not to re-use excavated topsoil unless approved in writing by departmental representative.

.9 Contractor to provide justification for re-uses of materials. Departmental representative has final say in the re-use of excavated material. If re-use is approved:

.1 Pile topsoil in berms in locations as approved by Departmental Representative. Stockpile height not to exceed 2.5 - 3 m.

.2 Protect stockpiles from contamination and compaction.

.3 Cover topsoil that has been piled for long term storage, with trefoil or grass to maintain agricultural potential of soil.

.4 Topsoil that has been piled for long term storage (greater than 4 months) is to be seeded with annual rye grass to maintain agricultural

potential of soil and to reduce erosion and sediment

3.4 PREPARATION OF GRADE

.1 Verify that grades are correct and notify Departmental Representative if discrepancies occur and do not begin work until instructed by Departmental Representative.
  .1 Grade area only when soil is dry to lessen soil compaction.
  .2 Grade soil establishing natural contours and eliminating uneven areas and low spots, ensuring positive drainage.

3.5 PLACING OF TOPSOIL

.1 Place topsoil only after Departmental Representative has accepted subgrade.

.2 When replacing topsoil by truck, load with a small mechanical hoe (1.15 m3 or less) to allow for aeration of soil.

.3 Spread topsoil during dry conditions by mechanical hoe in uniform layers not exceeding 150 mm, over unfrozen subgrade free of standing water.

.4 Establish traffic patterns for equipment to prevent driving on topsoil after it has been spread to avoid compaction.

.5 Cultivate soil following spreading procedures

3.6 DISPOSAL

.1 Disposal of unused topsoil is to be in an environmentally responsible manner but not used as landfill as approved by Departmental Representative.

3.7 CLEANING

.1 Proceed in accordance with Section 01 74 11- Cleaning.

.2 Stockpile areas shall be restored to its original state as much as practicably possible or according to landscape plan and drawings. Final restored condition shall be approved by the Departmental Representative.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDE

.1 All related work for rough grading including subgrade preparation.

1.2 RELATED REQUIREMENTS

.1 Section 02 41 16 - Structure Demolition

.2 Section 31 05 17 - Aggregate Materials.

.3 Section 31 11 00 - Clearing and Grubbing.

.4 Section 31 14 13 - Soil Stripping and Stockpiling

.5 Section 31 23 33.01 - Excavation, Trenching and Backfilling

.6 Section 31 37 10 - Rip-Rap

.7 Section 31 23 16.26 - Rock Removal.

.8 Section 32 93 10 - Tree, Shrub and Ground cover Planting

1.3 MEASUREMENT AND PAYMENT

.1 Payments related to this Section shall be as set out in Section 01 22 01 – Measurement and Payment.

1.4 REFERENCES AND STANDARDS

.1 ASTM International
  .1 ASTM D698-12, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m3).

.2 Ontario Provincial Standard Specifications (OPSS)
  .1 OPSS.PROV 206, November 2014 – Construction Specification for Grading
  .2 OPSS.PROV 212, November 2013 - Construction Specification for Borrow
  .3 OPSS.MUNI 1010, November 2013 – Material Specification for Aggregates - Base, Subbase, Select Subgrade and Backfill Material
  .4 OPSS.PROV 1860, April 2018 - Material Specification for Geotextiles

.5 OPSS.PROV 182, November 2012 – General Specification for Environmental Protection for Construction in Waterbodies and on Waterbody Banks
.6 OPSS.PROV 501, April 2013 - Construction specification for Compacting
.7 OPSS.PROV 805, November 2010 – Construction Specification for Temporary Erosion and Sediment Control Measures
.8 OPSS 902, November 2010 - Construction Specification for Excavation and Backfilling – Structures

1.5 ACTION AND INFOMRMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

1.6 EXISTING CONDITIONS

.1 Contractor to establish location of all underground and surface utility lines before commencing work

PART 2 - PRODUCT

2.1 MATERIALS

.1 Fill material: Type Granular in accordance with Section 31 23 33.01- Excavating, Trenching and Backfilling and Section 31 05 17 – Aggregate Materials.

.2 Excavated or graded material existing on site suitable to use as fill for grading work if approved by Departmental Representative.

.3 Imported select clay type material approved by the Departmental Representative may be used for rough grading unless otherwise specified.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for rough grading installation in accordance with drawings and specifications.
.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 STRIPPING OF TOPSOIL

.1 Stripping of topsoil according to 31 14 13 – TOPSOIL STRIPPING AND STOCKPILING.

3.3 GRADING

.1 Rough grade to levels, profiles, and contours allowing for surface treatment as indicated.

.2 Rough grade to following depths below finish grades:
.1 200 mm for grassed areas.
.2 150 mm minimum for stockpiled areas.
.3 150 mm for camp area.
.4 75 mm for roads and driveway re-surfacing
.5 450 mm for gravel roads and parking lots (full restoration).
.6 To requirements as identified on contract drawings at other work areas.

.3 Slope rough grade away from roads and structures, 1:50 minimum.

.4 Grade ditches to capture run-off to depth as indicated.

.5 Prior to placing fill over existing ground, scarify surface to depth of 150 mm minimum before placing fill over existing ground. Maintain fill and existing surface at approximately same moisture content to facilitate bonding.

.6 Compact filled and disturbed areas to maximum dry density to ASTM D698, as follows:
.1 0.95% under all surfaces unless specified otherwise.

.7 Do not disturb soil within branch spread of trees or shrubs to remain.

3.4 TESTING

.1 Inspection and testing of soil compaction will be carried out by testing laboratory with Canadian Council Independent Laboratories (CCIL) designation. Costs of tests will be paid in accordance with Sections 01 29 83- Payment Procedures for Testing

Laboratory Services. Refer to Section01 45 00- Quality Control.

.2 Submit testing procedure, frequency of tests to Departmental Representative for review and approval.

3.5 CLEANING

.1 Clean in accordance with Section 01 74 11- Cleaning.

3.6 PROTECTION

.1 Identify all above-ground and below-ground works including utilities and services prior to commencement of construction.

.2 Protect existing trees, fencing, landscaping, natural features, bench marks, buildings, pavement, surface or underground utility lines which are to remain as directed by Departmental Representative. If damaged, restore to original or better condition unless directed otherwise.

.3 Maintain access roads to prevent accumulation of construction related debris on roads.

3.7 SURPLUS MATERIAL

.1 Remove surplus material and material unsuitable for fill, grading or landscaping off site as directed by Departmental Representative

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 All work related to rock removal within the construction area.

1.2 REFERENCE STANDARD

.1 Canadian Federal Legislation
  .1 Fisheries Law - article 32 and 35

.2 Canadian Standard Association (CSA)
  .1 CSA CAN3-Z107.54M85 (R2001) Procedure for Measurement of Sound and Vibration Due to Blast Operations

.3 Ontario Provincial Standard Specifications (OPSS)
  .1 OPSS.PROV 182, November 2012 - Environmental Protection for Construction in Waterbodies and on Water Banks (November 2010)
  .2 OPSS.PROV 206, November 2014 – Construction Specification for Grading

1.3 DEFINITIONS

.1 Rock: any solid material in excess of 2 m3 and which cannot be removed by means of heavy duty mechanical excavating equipment with minimum operating weight of 26,500 kg and a rock bucket of 0,9 to 1.15 m3. Frozen material not classified as rock.

.2 Sound rock surface: The sound rock surface is reach when the rock as per 1.3.1 – rock definition is reach. The rock surface has to be inspected and accepted by the Departmental Representative before being considered the sound rock surface.

.3 The "Excavation Limits surfaces" are defined as the lines shown on the plans inside which the Departmental Representative measures the conformity of the works with the plans and specification. No rock can be left inside the minimum excavation limits.

.4 Rock dental excavation and /or scaling includes the removal of any loose, slabby, fractured, deteriorated, or incompetent rock by mechanical and manual means where requested by the Departmental Representative to treat special localized rock defects.

1.4 MEASURMENT AND PAYMENT PROCEDURES

.1 The contractor should include all cost for all work related to rock removal in the Rock Excavation Unit Price

.2 Measurement for payment for Rock Removal will be based on the measured rock volume between the accepted sound rock surface and the minimum excavation surface show on the drawings. The rock excavation will be payed at the rock unit price. The unit price quoted shall be a composite Unit Price for all labour, material and equipment necessary to a complete rock excavation work as specified.

.3 No separate payment for rock excavation will be made for overexcavation deeper than the minimum excavation limit unless:

.1 The overexcavation is requested by a written workorder by the Departmental Representative. In this case, the rock excavated will be payed at the dental excavation unit price.

.4 Measurement for payment of the dental excavation will be based on tape measurement on the field done jointly and signed by the contractor and the Departmental Representative.

.5 All excavation of soil, granular, loose rock and other debris for the dam excavation between the natural ground surface and the sound rock surface is considered common excavation and will be paid at the common excavation unit price.

.6 The natural ground surface, the sound rock surface and the final excavation surfaces are used for excavation payment and should be surveyed by the contractor in the presence of the departmental Representative. The survey surface data should be transmitted to the Departmental Representative within 48 h of the survey completion.

.7 Payments related to this Section shall be as set out in Section 01 22 01 – Measurement and Payment.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit submittals in accordance with Section 01 33 00-Submittal Procedures.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

3.1 ROCK REMOVAL

.1 Before the rock excavation start, the sound rock surface should be reached, accepted by the Departmental representative and surveyed by the contractor in the presence of the Departmental Representative. The sound rock surface is reached when all soil, granular, loose material and debris is removed, and the rock as defined in 1.3.1 is reached.

.2 Perform excavation in accordance with Erosion and Sedimentation Control Plan.

.3 Co-ordinate this Section with Section 01 35 29.06- Health and Safety Requirements.

.4 Remove rock to alignments, profiles, and cross sections as indicated.

.5 Explosive blasting is not permitted on this project. All rock excavation should be done with mechanical means (hydraulic hammer, rock splitter…) Sound Rock mass drilling (min 90 mm diameter weakening at 300 mm c-c in both direction before mechanical excavation is required.

.6 Use rock removal procedures to produce uniform and stable excavation surfaces. Minimize overbreak, and to avoid damage to adjacent structures.

.7 Prepare rock surfaces which are to bond to concrete, by scaling, pressure washing and broom cleaning surfaces. All water infiltration must be controlled and taken outside the concrete foundation.

.8 Excavate trenches for dam key to width, lines and grades as indicated.

.9 Cut trenches to widths as indicated.

.10 Remove boulders and fragments which may slide or roll into excavated areas.

.11 Correct unauthorized rock removal at no extra cost, in accordance with Section 31 23 33.01- Excavating, Trenching and Backfilling.

.12 Excavated rock may be used for rip-rap material provided it meets the requirements of Section 31 05 17 and Section 31 37 10 and is approved by the Department Representative.

3.2 CLEANING

.1 Clean in accordance with Section 01 74 11- Cleaning.

.2 Rock Disposal:
.1 Dispose of surplus removed rock off site in accordance with Section 01 74 21- Construction/demolition Waste Management and Disposal.
.2 Do not dispose removed rock into landfill. Send material to appropriate deposit site as approved by Departmental Representative.
.3 Move, transport, and relocate rock to location identified for landscaping purposes.

.3 Waste Management: separate waste materials for recycling reuse in accordance with 01 74 21- Construction/Demolition Waste Management and Disposal.

3.3 PROTECTION

.1 Prevent damage to surroundings and injury to persons in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 31 23 33.01 - Excavation, Trenching and Backfilling

1.2 REFERENCE STANDARDS

.1 ASTM International
- .1 ASTM D422 - 63(2007)e2 Standard Test Method for Particle-Size Analysis of Soils
- .2 ASTM D4318 – 17e1 Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- .3 ASTM D698 – 12e2 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft3 (600 kN-m/m3).
- .4 ASTM D5084 – 16a Standard Test Methods for Measurement of Hydraulic Conductivity of Saturated Porous Material Using a Flexible Wall Permeameter.
- .5 ASTM D6938 – 17a Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
- .6 ASTM D4959 – 16 Standard Test Method for Determination of Water Content of Soil by Direct Heating.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 The Contractor shall submit a Work Plan including a list of the intended construction equipment, along with the method to be used to achieve the optimum moisture content, placement and compaction as specified herein.

.3 Samples:
- .1 Submit 3 samples.
- .2 Allow continual sampling by Departmental Representative during production.
- .3 Provide Departmental Representative with access to source and processed material for sampling.
- .4 Supply new or clean sample bags or containers according appropriate to impervious materials.

.1 Pay cost of sampling and testing of impervious which fail to meet specified requirements.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Transportation and Handling: handle and transport impervious fill to avoid segregation, contamination and degradation.

.2 Storage: store materials to allow free water to drain and for materials to attain uniform water content. Protect material such that it maintains its optimum moisture content.

.3 Conditioning: If material is not at its acceptable range of moisture content, it may require moisture conditioning prior to final placement.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 The material for use as impervious fill shall consist of low to high plasticity silty clay free from organics, roots, rock, snow, ice or any other deleterious material that would detract from the properties of a low permeability clay soil.

.2 The impervious fill material shall meet the following requirements:

Parameter	**Test Method**	**Specified Limit**
Liquid Limit	ASTM D4318	20% minimum
Plasticity Index	ASTM D4318	8% minimum
Effective Permeability	ASTM D5084	10^{-5} cm/s maximum
Fines Content	ASTM D422	30% minimum

.3 The material shall be obtained from the required onsite excavations or offsite borrow locations.

2.2 SOURCE QUALITY CONTROL

.1 Inform Departmental Representative of proposed source of impervious backfill and provide access for sampling 4 weeks minimum before starting production.

.2 If materials from proposed source do not meet, or cannot reasonably be processed to meet, specified requirements, locate alternative source.

.3 Advise Departmental Representative four (4) week minimum in advance of proposed change of material source.

.4 Acceptance of material at source does not preclude future rejection if it fails to conform to requirements specified, lacks uniformity, or if its field performance is found to be unsatisfactory.

PART 3 - EXECUTION

3.1 PREPARATION

.1 General
- .1 Impervious Backfill shall be placed after the foundation has been prepared. No material shall be placed on the foundation until it has been inspected and accepted.
- .2 Fill shall not be placed in a frozen condition and shall not be placed on a surface which is frozen or covered with snow or ice. Placing of fill in freezing weather will not be permitted. The Impervious Backfill shall be placed and managed to promote surface water runoff and minimize the risk of precipitation ponding that could affect the compacted fill already in place. Any portion of the Impervious Backfill which has suffered a reduction in density due to the action of frost, rain, or due to any other reason, shall be scarified and re- compacted, or removed and replaced with suitable material.
- .3 If fill activities are to be discontinued for an extended period of time or when rain is anticipated, the surface of the Impervious Backfill material shall be raised above the adjacent zones, crowned to promote surface runoff, and sealed to minimize infiltration.
- .4 When tying into an existing soil face, all loose, dried or altered fill shall be removed to a suitable depth. For each lift of new Impervious Backfill material placed, the Contractor shall excavate or “step” into the existing clay face by 250 mm to 350 mm horizontally to produce a horizontal and level surface that will be flush with the surface of the new Impervious Backfill material lift being placed, thereby allowing the contact with the existing soil face to be compacted with the new fill.

.2 Placement
- .1 All Impervious Backfill shall be placed in the dry under dewatered conditions to the lines and grades as shown on the Drawings. The material

shall be placed in such a manner to achieve a stable and homogeneous fill which is free of horizontal stratifications and lenses or pockets of pervious materials, and from lumps of materials that do not satisfy the requirements of these Specifications. Care shall be taken during placement to prevent contamination by mixing with adjacent granular materials.

.2 Impervious Backfill shall be deposited and spread in approximately horizontally uniform homogenous layers at maximum 0.15 m thick lifts (uncompacted thickness) for the full width of the zone.

.3 At contacts between the fill and the abutments or concrete structures, the fill shall be sloped at approximately 6H:1V within 4 m of the contact to achieve the best possible contact.

.4 The allowable fill tolerances shall be within ± 50 mm vertically of the grades shown on the Drawings. Tolerance for the horizontal width and zone thickness of the Impervious Backfill material shall be within ±150 mm of the dimensions shown on the Drawings.

.3 Compaction

.1 Each lift shall be thoroughly compacted for its full depth. The density for an average of any ten consecutive field test samples, shall not be less than 98% of the maximum Standard Proctor Maximum Dry Density with a moisture content between 1% below and 3% above the optimum moisture content. The density of the impervious material, as indicated by any single test, shall not be less than 95% of the Standard Proctor Maximum Dry Density.

.2 Impervious Backfill placed immediately over and adjacent to bedrock and concrete shall be conditioned such that the moisture content of the fill is between optimum and 3% above Standard Proctor Optimum moisture content to achieve the best possible contact.

.3 Each lift shall be subject to Quality Assurance testing and acceptance by the Departmental Representative prior to placement of successive lifts. Any lifts that have been placed overtop of unapproved material shall be removed. Any such removal will not be separately measured or paid for.

3.2 CLEANING

.1 clean in accordance with Section 01 74 11 - Cleaning.

.2 Leave Impervious Backfill stockpile site in tidy, well drained condition, free of standing surface water.

.3 Leave any unused Impervious Backfill in neat compact stockpiles as directed by Departmental Representative.

.4 For temporary or permanent abandonment of Impervious Backfill source, restore source to condition meeting requirements of authority having jurisdiction.

.5 Restrict public access to temporary or permanently abandoned stockpiles by means acceptable to Departmental Representative.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 02 41 16 – Structure Demolition

.2 Section 01 35 43 – Environmental Procedures

.3 Section 01 35 46 – Archeological and Cultural Procedures

.4 Section 31 23 16.26 – Rock Removal

1.2 REFERENCES

.1 Construction to be in accordance with the latest edition of the applicable Ontario and National codes. The above to govern except where other applicable codes or provided notes are more restrictive.

.2 ASTM International
  .1 ASTM D4318 – 17e1, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
  .2 ASTM D422 - 63(2007)e2 Standard Test Method for Particle-Size Analysis of Soils.

.3 Canadian General Standards Board (CGSB)
  .1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
  .2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

.4 Canadian Standards Association (CSA International)
  .1 CSA A3000-18, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
    .1 CSA-A3001-18, Cementitious Materials for Use in Concrete.
  .2 CSA A23.1:19/A23.2:19, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

1.3 DEFINITIONS

.1 Excavation classes: three classes of excavation will be recognized; common excavation, rock excavation and dental excavation.
  .1 Rock: refer to 31 23 16.26 Rock Removal.
  .2 Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation or dental excavation

.3 Dental excavation: removal of any loose, slabby, fractured, deteriorated, or incompetent rock by mechanical and manual means were requested by the Departmental Representative to treat special localized rock defects after the sound rock surface is reach refer to 31 23 16.26 Rock Removal.

.2 Unclassified excavation: excavation of deposits of whatever character encountered in Work.

.3 Topsoil:
.1 Material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.
.2 Material reasonably free from subsoil, clay lumps, brush, objectionable weeds, and other litter, and free from cobbles, stumps, roots, and other objectionable material larger than 25 millimeters in any dimension.

.4 Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of Work.

.5 Waste materials: excavated materials unsuitable for use in the Work or surplus to the requirements.

.6 Recycled fill material: material, considered inert, obtained from alternate sources and engineered to meet requirements of fill areas.

.7 Unsuitable materials:
.1 Weak, chemically unstable, and compressible materials.
.2 Frost susceptible materials:
.1 Fine grained soils with plasticity index less than 10 when tested to ASTM D4318, and gradation within limits specified when tested to ASTM D422: Sieve sizes to CAN/CGSB-8.1.
.2 Table:

Sieve Designation	% Passing
2.00 mm	100
0.10 mm	45 - 10
0.02 mm	10 - 80
0.005 mm	0 - 45

.3 Coarse grained soils containing more than 20% mass passing 0.075 mm sieve.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Quality Control:
- .1 Submit condition survey of existing conditions as described in EXISTING CONDITIONS article of this Section.
- .2 Submit to Departmental Representative written notice at least 7 days prior to excavation work, to ensure cross sections are taken.
- .3 Submit to Departmental Representative written notice when bottom of excavation is reached.
- .4 Submit to Departmental Representative testing and inspection results as described in PART 3 of this Section.

.3 Preconstruction Submittals :
- .1 Submit to Departmental Representative construction equipment list for major equipment to be used in this section prior to start of Work.
- .2 Submit to Departmental Representative records of underground utility locates, indicating: location plan of existing utilities as found in field, clearance record from utility authority, location plan of relocated and abandoned services, as required.

.4 Samples:
- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Inform Departmental Representative at least 2 weeks prior to beginning Work, of proposed source of fill materials and provide access for sampling.
- .3 Ship samples to Departmental Representative, in tightly closed containers, to prevent contamination and exposure to elements.
- .4 Sample should be of sufficient size to allow for gradation sampling when tested to ASTM D422.

1.5 QUALITY ASSURANCE

.1 Test matrial acorindg to Quality Management Plan and Inspection and Testing Plan as set out in 01 45 00 - QUALITY ASSURANCE AND QUALITY CONTROL.

.2 Do not use soil material until written report of soil test results are approved by Departmental Representative.

1.6 EXISTING CONDITIONS

.1 Contractor and or his Geotechnical Engineer shall examine all geotechnical reports available from the Departmental Representative.

.2 Buried services:
- .1 Before commencing work establish location of buried services on and adjacent to site.
- .2 Arrange with appropriate authority for relocation of buried services that interfere with execution of work: pay costs of relocating services.
- .3 Remove obsolete buried services within 2 m of foundations: cap cut-offs.
- .4 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.
- .5 Prior to beginning excavation Work, notify applicable Departmental Representative and authorities having jurisdiction, establish location and state of use of buried utilities and structures. Authorities having jurisdiction to clearly mark such locations to prevent disturbance during Work.
- .6 Confirm locations of buried utilities by careful test excavations or soil hydrovac methods.
- .7 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered.
- .8 Where utility lines or structures exist in area of excavation, obtain direction of Departmental Representative before re- routing. Costs for such Work to be paid by Subcontractor.
- .9 Record location of maintained, re-routed and abandoned underground lines.
- .10 Confirm locations of recent excavations adjacent to area of excavation.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Refer to drawings for soil and rip-rap specification and OPSS standards

PART 3 - EXECUTION

3.1 SITE PREPARATION

.1 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.

.2 Proceed to the natural ground survey in the presence of the Departmental Representative. Send the survey within 48h of survey completion.

3.2 PREPARATION/ PROTECTION

.1 Protect existing features in accordance with Scope of Work.

.2 Keep excavations clean, free of standing water, and loose soil.

.3 Provide shoring and bracing if required.

.4 Where soil is subject to significant volume change due to change in moisture content, cover and protect to Departmental Representative approval.

.5 Protect natural and man-made features required to remain undisturbed. Unless otherwise indicated or located in an area to be occupied by new construction, protect existing trees from damage.

.6 Protect buried services that are required to remain undisturbed.

3.3 Shoring, Bracing and Underpinning

.1 Maintain sides and slopes of excavations in safe condition by appropriate methods and in accordance with Health and Safety Act for the Province of Ontario, Section01 35 29.06 - HEALTH AND SAFETY REQUIREMENTS.
  .1 Where conditions are unstable, verify and advise methods to rectify the conditions with the approval of Department Representative.

.2 During backfill operation:
  .1 Unless otherwise indicated or directed by Departmental Representative, remove sheeting and shoring from excavations.
  .2 Do not remove bracing until backfilling has reached respective levels of such bracing.
  .3 Pull sheeting in increments that will ensure compacted backfill is maintained at elevation at least 500 mm above toe of sheeting.

.3 When sheeting is required to remain in place, cut off tops at elevations as indicated.

3.4 STOCKPILING

.1 Stockpile fill materials as required.
  .1 Stockpile granular materials in manner to prevent segregation.

.2 Protect fill materials from contamination.

.3 Implement sufficient erosion and sediment control measures to prevent sediment release off construction boundaries and into water bodies as per Section 01 35 43 – Environmental Procedures.

.4 Surround all stockpiled materials with reptile and amphibian exclusion fencing in accordance with Section 01 35 43 – Environmental Procedures.

3.5 EXCAVATION

.1 Advise Departmental Representative at least 7 days in advance of excavation operations for initial survey to be taken.

.2 For temporary slopes, where show on drawings, the contractor should submit slope design including temporary shoring design if temporary shoring is use. Temporary excavation design should be submitted allowing sufficient time for review by the departmental representative.

.3 Excavate to lines, grades, elevations and dimensions as indicated.

.4 Remove concrete, masonry, paving, walks, demolished foundations, rubble and other obstructions encountered during excavation in accordance with Section 02 41 16 - Structure Demolition, Section 01 35 43 – Environmental Procedures, and Section 01 35 46 – Archeological and Cultural Procedures.

.5 Excavation must not interfere with bearing capacity of adjacent foundations.

.6 Keep excavated and stockpiled materials safe distance away from edge of trench as directed by Departmental Representative.

.7 Restrict vehicle operations directly adjacent to open trenches.

.8 Dispose of surplus and unsuitable excavated material in approved location.

.9 Do not obstruct flow of surface drainage or natural watercourses.

.10 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.

.11 Notify Departmental Representative when bottom of excavation is reached.

.12 Obtain Departmental Representative approval of completed excavation.

.13 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed by Departmental Representative.

.14 Correct unauthorized over-excavation as follows:
- .1 Fill under bearing surfaces and footings with concrete specified for footings.
- .2 Fill under other areas with Type 2 fill compacted to not less than 95 % of corrected Standard Proctor maximum dry density.

.15 In the dam footprint area, when the sound rock surface is reached and accepted by the Departmental Representative, the surface should be surveyed by the contractor in the presence of the Departmental Representative. The survey should be sent within 48 h of completion.

.16 Hand trim, make firm and remove loose material and debris from excavations.
- .1 Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil.
- .2 Clean out rock seams and fill with concrete mortar or grout to approval of Departmental Representative.

3.6 Foundation or Surface Preparation

.1 This subsection applies to the foundations on overburden and rock for backfilling.

.2 Contractor to demonstrate to the Departmental Representative the equipment suitability, methods of working, rate of progress and quality of work during the initial stage of work.

.3 Proof-roll excavated foundation soil with a minimum 4 passes of compaction using 10 ton smooth drum vibratory compactor or other methods as approved by the Departmental Representative.

.4 For slope, proof-rolling on excavated surface can be carried out using slope plate compactor. The finished

surface shall be smooth, compact and uniform and to be approved by the Departmental Representative

.5 Do not proceed with fill or concrete placement until completion of following:
- .1 The Departmental Representative has inspected and approved the prepared foundation surface.
- .2 The Departmental Representative has inspected and approved construction below finish grade.
- .3 Inspection, testing, approval and recording location of underground utilities.
- .4 Removal of concrete formwork.
- .5 Removal of shoring and bracing; backfilling of voids with satisfactory soil material.

.6 Avoid water to pond on the surfaces of the fill or foundation areas.

.7 Ensure backfilled areas free from debris, snow, ice, water and frozen ground before placing new lift of materials.

.8 Prior to fill placement, ensure that the moisture content and the surface have appropriate wetness to provide a good bond with the freshly placed material. Scarify or adjust the moisture content of the surface if required. Ensure that any shrinkage cracks that develop on the prepared or compacted surface due to desiccation are removed prior to placing the next lift.

.9 Rock surface treatment to be conducted as per section 31 60 00 Bedrock Foundation Treatment.

3.7 FILL TYPES AND COMPACTION

.1 Use types of fill as indicated or specified on Contract Drawings.

.2 Aggregate fill per section 31 05 16 - Aggregate Materials.

3.8 BACKFILLING

.1 Do not proceed with backfilling operations until completion of following:
- .1 Departmental Representative has inspected and approved installations.
- .2 Departmental Representative has inspected and approved of construction below finish grade.
- .3 Inspection, testing, approval, and recording location of underground utilities.
- .4 Removal of concrete formwork.

.5 Removal of shoring and bracing; backfilling of voids with satisfactory soil material.

.2 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.

.3 Do not use backfill material which is frozen or contains ice, snow, debris or excess water.

.4 Place backfill material in uniform layers not exceeding 150 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.

.5 Backfilling around installations:
- .1 Place bedding and surround material as specified elsewhere.
- .2 Do not backfill around or over cast-in-place concrete within 24 hours after placing of concrete or as required for concrete to achieve adequate strength whichever comes later.
- .3 Place layers simultaneously on both sides of installed Work to equalize loading. Difference not to exceed 0.5 m.
- .4 Where temporary unbalanced earth pressures are liable to develop on walls or other structures:
  - .1 Permit concrete to cure for minimum 14 days or until it has sufficient strength to withstand earth and compaction pressure and approval obtained from Departmental Representative:
  - .2 If approved by Departmental Representative, erect bracing or shoring to counteract unbalance, and leave in place until removal is approved by Departmental Representative.

.6 Install drainage system in backfill as indicated in drawings.

.7 Compaction:
- .1 Vibratory slope roller or plate compactors can be used for compacting on slope.
- .2 Compact each lift in strips overlapping with adjacent strips not less than 0.6 m.
- .3 Ensure that the interface between the existing slope and the new fill receive good compaction and have good bonding.
- .4 Stop placement of material when satisfactory compaction cannot be achieved due to rain or freezing conditions. Provide measures to protect fill from freezing as approved by the Departmental Representative.
- .5 If the specified compaction of a material cannot be achieved due to the use of improper compaction equipment, immediately replace such

equipment with new equipment suitable for compaction of the material.

.6 Clear stone for the subsoil drainage if specified shall be placed and compacted at every lift with small plate tamper not more than 4 passes to form a firm mass, but avoid crushing the stones.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDE

.1 Materials and installation geotextiles used in erosion protection system for permanent Works, and for void control temporary works, the purpose of which is to:
  .1 Separate and prevent mixing of granular materials of different gradation and type.
  .2 Act as hydraulic filters permitting passage of water while retaining underlying soil structure.

1.2 RELATED REQUIREMENTS

.1 Section 31 23 33.01 - Excavating, Trenching and Backfilling.

.2 Section 01 61 00 – Common Product Requirements

.3 Section 31 24 13 - Roadway Excavating, Embankment and Compaction

.4 Section 31 37 10 - Rip-rap

.5 Section 32 91 19.13 - Topsoil Placement and Grading

1.3 MEASUREMENT AND PAYMENT

.1 Payments related to this Section shall be as set out in Section 01 22 01 – Measurement and Payment.

1.4 REFERENCES AND STANDARDS

.1 Construction to be in accordance with the latest edition of the applicable Ontario and National codes. The above to govern except where other applicable codes or provided notes are more restrictive.

.2 American Society for Testing and Materials International, (ASTM)
  .1 ASTM D3786/D3786M - 18, Standard Test Method for Bursting Strength of Textile Fabrics—Diaphragm Bursting Strength Tester Method.
  .2 ASTM D4355/D4355M – 14(2018), Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc-Type Apparatus.
  .3 ASTM D4533/D4533M - 15, Standard Test Method for Trapezoid Tearing Strength of Geotextiles.

.4 ASTM D4491/D4491M - 17, Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
.5 ASTM D4632/D4632M – 15a, Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
.6 ASTM D4751 - 20, Standard Test Method for Determining Apparent Opening Size of Geotextile.
.7 ASTM D4833/D4833M – 07(2013)e1, Standard Test Method for Index Puncture Resistance of Geomembrane and Related Products.
.8 ASTM D5261 – 10(2018), Standard Test Method for Measuring Mass per Unit Area of Geotextiles.

.3 Canadian Standards Association (CSA International)
.1 CSA G40.20/G40.21-13 (R2018), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
.2 CSA G164-18, Hot dip galvanizing of irregularly shaped articles.

.4 Ontario Provincial Standard Specifications (OPSS)
.1 OPSS.PROV 1860, April 2018- Material Specification for Geotextiles

1.5 ACTION AND INFOMRMATIONAL SUBMITTALS

.1 Provide in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for geotextiles and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Samples:
.1 Submit following samples 2 weeks prior to beginning Work.
.1 Minimum length of 2 m of roll width of geotextile.
.2 Methods of joining.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements with manufacturer's written instructions.

.2 Storage and Handling Requirements:

.1 Store materials indoors in dry location off ground and in accordance with manufacturer's recommendations in clean, dry, well- ventilated area.
.2 Protect geotextiles from direct sunlight, ultraviolet rays, excessive heat, mud, dirt, dust, debris and rodents, and to requirements of OPSS.PROV 1860, April 2018.
.3 Store and protect geotextiles from direct sunlight and UV rays.
.4 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Geotextile (for permanent Works):non-woven synthetic fibre fabric, supplied in rolls.
.1 Width: approved by the Departmental Representative.
.2 Length: as indicated on drawings, and to the longest laying length.
.3 Composed of: minimum 95% by mass of polypropylene, polyethylene, polyester or other polymers, excluding polyamides, with inhibitors added to base plastic to resist deterioration by ultra-violet and heat exposure for 60 days.
.4 Physical properties:
.1 Mass per unit area: to ASTM D5261, minimum 200 g/m^2.
.2 Grab Tensile strength and elongation (in any principal direction): to ASTM D4632/D4632M.
.1 Tensile strength: minimum 690 N.
.2 Elongation at break: minimum 50%.
.3 Trapezoid tear strength: to ASTM D4533/D4533M, minimum 275 N.
.4 Puncture resistance: to ASTM D4833/D4833M, minimum 400 N.
.5 Mullen burst: to ASTM D3786/D3786M, 2.17 MPa
.6 Hydraulic properties:
.1 Permittivity: to ASTM D4491/D4491M, 1.6 sec-1.
.2 Water flow rate: to ASTM D4491/D4491M, 4480 l/min/m2.
.3 .Apparent opening size (AOS): to ASTM D4751, 0.212 mm.
.7 UV Stability: to ASTM D4355, 70% at 500h.
.5 Securing pins and washers: to CSA G40.20/G40.21 Grade 300W, hot-dipped galvanized with minimum zinc coating of 600 g/m2 to CSA G164.

.6 Geotextile for temporary sediment and erosion control measures shall be non-woven and as approved by the Departmental Representative

PART 3 - EXECUTION

3.1 Examination

.1 Verification of Conditions: verify that conditions of substrate previously installed under other sections or contracts are acceptable for geotextile material installation in accordance with manufacturer's written instructions.
- .1 Visually inspect substrate in presence of Departmental Representative.
- .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 Installation

.1 Place geotextile material by unrolling onto graded surface in orientation, manner and locations indicated and retain in position with pins as per the geotextile manufacturer's recommendations or to the requirements of the Departmental Representative.
- .1 Orientation of geotextile shall be: first in the direction of the slope and second, in the direction of channel flow. The orientation shall be approved by the Departmental Representative.
- .2 The geotextile shall be set, together with geocells where applicable, into an anchor trench (0.5m depth and 0.3m wide) and duly secured along the top edge and upstream edge (flow direction) as approved by the Departmental Representative.

.2 Place geotextile material smooth and free of tension stress, folds, wrinkles and creases.

.3 Place geotextile material on sloping surfaces in one continuous length from toe of slope to upper extent of geotextile as approved by the Departmental Representative.

.4 Overlap each successive strip of geotextile to the manufacturer's recommendation, but to a minimum of 600 mm over previously laid strip. Where overlap joints are perpendicular to the channel flow, the overlap joint shall be in the flow direction.

.5 Pin successive strips of geotextile with securing pins to the manufacturer's recommendations.

.6 Protect installed geotextile material from displacement, damage or deterioration before, during and after placement of material layers.

.7 After installation, cover with overlying layer within 4 hours of placement.

.8 Replace damaged or deteriorated geotextile to approval of Departmental Representative.

.9 Place and compact material in accordance with section 31 23 33.01.

3.3 PROECTION

.1 Vehicular traffic or construction machinery is not permitted directly on geotextile.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 31 23 33.01 - Excavation, Trenching and Backfilling

.2 Section 03 30 00 – Cast-In-Place Concrete

.3 Section 31 60 00 – Bedrock Foundation Treatment

.4 Section 31 05 16 – Aggregate Materials

1.2 REFERENCE STANDARDS

.1 American Society for Testing and Materials International, (ASTM)
  .1 ASTM C939/C939M – 16a, Standard Test Method for Flow of Grout for Preplaced-Aggregate Concrete (Flow Cone Method).
  .2 ASTM C150/C150M – 19a, Standard Specification for Portland Cement.

.2 Canadian Standards Association (CSA International)
  .1 CSA A23.1:19/A23.2:19, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
  .2 CSA A3000-18, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005)
  .3 CSA A82.56M-1976, Aggregate for Masonry Grout

1.3 MEASURMENT AND PAYMENT PROCEDURES

.1 The contractor should include all cost for all work related to drilling in the and grouting in the most appropriate pay item. No separate payment will be made for drilling and grouting.

.2 For payment, 1 bag of 40kg of cement = 0,0283 m^3.

.3 A successful grouting stage is achieved when 0 l of grout in 5 minutes at the grouting pressure is taken by the pass being grouted.

.4 Quantity check and sign off by the contractor and the Departmental representative should be done weekly or more often.

.5 Water test quantity is measured for effective water testing time. Effective time per test starts when full

testing pressure is achieved until duration of successful test.

.6 Payments related to this Section shall be as set out in Section 01 22 01 – Measurement and Payment.

1.4 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 – Submittal Procedures

.2 Grouting Contractor Qualifications
.1 The Contractor or the Contractor's grouting sub-contractor shall be a well-established geotechnical contractor with proven experience and ability in the drilling and grouting of rock and including ground improvement, ground treatment and foundation- related construction.

.3 The Contractor shall submit a Work Plan specifying the details of proposed material, equipment, methods, and procedures for the supply and installation of the grout curtain for review. The Work Plan shall also include the Contractor's environmental plan for the containment and disposal of waste water and grout spillage.

.4 The Contractor shall supply the details of the grouting progress, including number, location, length of grout holes drilled and amount of cement grout injected on a daily basis.

.5 Calibration records including date of last calibration and expiry date of all flow and pressure gauges.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Cement
.1 Cement used in grouting operations shall be Type GU, supplied and stored in an appropriate manner as per the manufacturer's recommendations.

.2 Water
.1 Water shall be clean and free from contaminants including but not limited to sewage, oil, acid, alkali, salts, organic matter, or any foreign solids.
.2 Use water having a temperature less than 25°C and greater than 5°C.

.3 Sand

.1 Sand shall consist of hard, dense, durable, uncoated rock fragments with not more than 5 percent of deleterious substances including organic impurities and clay lumps.

.2 When tested, in accordance with CSA A23.2-2A "Sieve Analysis of Fine and Coarse Aggregate", sand shall have a fineness modulus from 1.5 to 2.0 and shall fall within the following limits of gradation:

Standard Sieve Size (mm)	Percent Passing by Weight
1.25	100
0.630	45 - 100
0.315	25 - 60
0.160	12 - 30
0.080	0 - 5

.3 The Departmental Representative will define when and how much sand shall be added to the grout mix.

.4 Admixtures

.1 A water soluble, polymer based, thixotropic powder additive used to prevent wash-out of cement when grouting in flowing water conditions should be available on site and added in the grout as directed by the Departmental Representative. When antiwashout additive is use, the antiwashout additive should be added as close as possible of the grouting hole and may need grouting equipment move or additional pump and upper located near the grouting hole.

.2 Grouting additive superplasticizer shall be added to the grout mix thicker than 1:1 ratio in order to maintain flowability of the grout. The superplasticizer should be compatible with antiwashout additive. The contractor should test the grout mix with his chosen superplasticiser and supply the test result showing marsh cone viscosity, density and bleeding.

2.2 SOURCE QUALITY CONTROL

.1 Inform Departmental Representative of proposed source of aggregates and provide access for sampling 4 weeks minimum before starting production.

.2 If materials from proposed source do not meet, or cannot reasonably be processed to meet, specified requirements, locate alternative source.

.3 Advise Departmental Representative four (4) week minimum in advance of proposed change of material source.

.4 Acceptance of material at source does not preclude future rejection if it fails to conform to requirements specified, lacks uniformity, or if its field performance is found to be unsatisfactory.

.5 The Contractor shall perform sufficient number of Trial Batches of each planned grout mix, including admixtures, using the proposed equipment to establish base line reference data, as accepted by the Departmental Representative, for the following Quality Assurance tests:
.1 Specific Gravity (Mud balance)
.2 Flow (Flow Cone)
.3 Gel and Set Time (Grout Cubes)
.4 Bleeding

.6 During the Work, the Specific Gravity shall be tested the greater of once per day, one for every 2 batches of the same grout mix, and every time the grout mix is thickened.

.7 During the Work, the Flow shall be tested the greater of once per day, one for every 2 batches of the same grout mix, and every time the grout mix is thickened.

.8 Any batch tested which does not correspond to the established base line reference shall be rejected for placement.

PART 3 - EXECUTION

3.1 PREPARATION

.1 Drilling and pressure grouting will be performed under the constant technical direction and supervision of the Departmental Representative. This may include, but not be limited to, detailed design and establishment of procedures to be adopted; determination of grout hole locations; orientation and sequence of drilling and washing holes; materials, additives, properties, pressures and pumping rates to be used for grouting; mixture modifications to be made in all aspects of grouting procedures. Such adjustments and modifications required by the Departmental Representative will be executed by the Contractor without cause for delay in the construction program.

.2 Changes may be necessary in both the layout and number of grout holes necessary to achieve an effective grout curtain, as conditions encountered during the work are evaluated and as directed by the Departmental Representative.

.3 Grout mixes, pressures, pumping rates, and the locations and sequence in which holes are drilled, washed, tested and grouted will be as specified herein or defined by Departmental Representative and as modified by the Departmental Representative to suit actual foundation conditions and grout takes encountered in the field during construction.

.4 Equipment

.1 Any grout hole that is lost or damaged due to mechanical failure of equipment, or inadequacy of grout supply, shall be replaced by the Contractor.

.2 Standard drilling equipment of the rotary and percussion type shall be used to perform the drilling as specified herein.

.5 Percussion drilling equipment shall be equipped for continuous flushing (water) of holes during drilling, and capable of drilling 50 mm diameter, minimum, holes to a maximum depth of 50 m.

.6 Washing and pressure testing equipment shall include pumps and packer or seal assemblies. The pumps furnished shall be of the gear, centrifugal, or other equivalent types subject to review by the Departmental Representative, with a maximum output of not less than 100 L/min at 1050 kPa, and shall be capable of maintaining constant pressures. There shall be a water supply with storage tanks sufficient for the pumps. An adequate air supply at a maximum pressure of 700 kPa shall be provided for washing operations.

.7 Certified electronic flow meters giving instant flow with a 1/10 of a liter precision and pressure gauges suitable for reading the appropriate working ranges shall be mounted on a suitable header supplied for each pump. The Contractor shall make available a means of checking pressure and flow with mechanical measuring devices. Certified testing equipment shall be provided for checking flow and pressure gauges.

.8 The packers or seals shall either be of the mechanically expanded rubber sleeve, multiple leather cup, pneumatically expanded rubber sleeve types, or other equivalent type subject to review by the Departmental Representative. Packers shall be capable of sealing holes at any specified elevation down to a maximum vertical depth of 10 m in bedrock, and of

withstanding, without leakage for a period of 10 minutes, water pressure equal to the maximum grout pressure. The type of packer shall be varied to suit rock conditions, as accepted by the Departmental Representative. It should be possible to use these packers either singly or in pairs separated by up to 6 m of perforated pipe. There shall be sufficient perforations in the pipe to provide negligible obstruction to the flow of water. The diameter of the pipes used for separating the packers and for placing the packers in holes shall be the maximum possible for the size of the hole.

.9 The grouting plant shall be capable of supplying, mixing, agitating, and pumping sanded grout to the proportions as specified under 3.1.6 of this Section, and to the satisfaction of the Departmental Representative. Mixers shall be of the high speed colloidal type. Each grouting unit shall include at least one pump of the progressive cavity type with a capacity of at least 100 L/min of mixed grout at a maximum discharge pressure of 700 kPa. Batching apparatus shall be capable of accurately measuring quantities of grout materials incorporated into mixes. Mixers, holding tanks and sumps shall be calibrated in litres to facilitate modification of mixes. An adequate supply of grout materials shall be maintained at each grouting unit so that grouting can be performed without interruption.

.10 Mixing time shall be adequate to obtain grout that is uniform and effectively mixed. Mixing time should be 3 minutes minimum. A hi energy (colloidal) mixer shall be available, ready for use, to produce grout at the rates required by the hole or holes being grouted and without interruption.

.11 Grout materials shall be maintained in suspension in a mechanically agitated sump or holding tank, equipped with screens to remove hardened grout which does not pass the 4.75 mm sieve.

.12 A double-line pumping system shall be used, in which one line will supply grout from the pump to the header at the collar of the hole, and the other line will return grout from the header to the sump. The inside diameter of all lines, valves, and connections shall not be less than 25 mm. The number and sizes of obstructions in the lines shall be kept to a minimum. Grout may be mixed in a central plant and pumped to an agitated sump at a second pumping plant which shall be located not more than 50 m from the hole. The distance between the central plant and the agitated sump shall not exceed 60 m.

.13 The grout header shall be provided for feeding grout into the holes. The header shall include a supply connection, a connection with a valve to the holes, and a return line with a valve. Appropriate pressure gauges for the required pressure range shall be fitted such that one indicates the pressure of the supply of grout at the header and the other indicates the back pressure of grout in the hole.

.14 When the individual elements of plant are so located that communication by normal voice between the elements is not satisfactory, the Departmental Representative may require the Contractor to install a telephone or radio system or other approved means of communication.

.15 Grout Mixes

.1 The Contractor shall use the following grout mix proportions as directed by the Departmental Representative. The Departmental Representative may direct the Contractor to use additional or varied grout mixes.

Constituents	A-mix	B-mix	C-mix	D-mix	E-mix
Cement (kg)	20.0	20.0	20.0	20.0	20.0
Water (L or kg)	40.0	20	20	10.0	10
Superplasticizer (mL)	no	no	*1	*2	*3
Antiwashout additive	no	no	50g	50g	Up to 200 g
Sand (kg)	0	0	0	0	Up to 10 kg

*1: To be determine by contractor test to respect 40 sec marsh cone viscosity

*2: To be determine by contractor test to respect 50 sec marsh cone viscosity
*3: To be determine by contractor test to respect system workability

.16 Consolidation Grouting

.1 Consolidation grouting consists of the drilling and grouting of a pattern of shallow holes in the foundations. The requirement and extent of this type of grouting will be determined by the Departmental Representative on completion of excavation in the areas.

.17 Curtain Grouting

.1 Curtain grouting will consist of the drilling and grouting a line of holes in the bedrock, as shown on Drawings and as directed by the Departmental Representative.

.2 Vertical holes will be required; and the angle of inclination for each hole as shown on Drawings and as directed by the Departmental Representative.

.3 Unless otherwise directed, the grouting shall be carried out in sequence whereby the split-spacing procedure, where initial holes (primary) are drilled and grouted prior to drilling and grouting of secondary and tertiary holes, shall be followed. Initial primary holes shall be spaced as shown on the Drawings. Subsequent secondary holes and tertiary holes shall be located midway between primary and secondary holes respectively. Further sequences of holes (quaternary) may be considered, depending on the bedrock conditions and grout takes of the adjacent holes. Grouting of additional holes spaced between the previous holes shall be continued as required to achieve the necessary tightness and seal, as directed by the Departmental Representative.

.4 Curtain grouting shall be performed by the stop grouting method (upstage grouting), where each hole is grouted in sections isolated by a packer set at decreasing depths, as directed by the Departmental Representative.

.18 Grouting Procedure

.1 The Contractor shall complete the foundation preparation and pour the concrete first stage prior to grouting in the Sluice area of the dam.

.2 The Contractor should complete the grouting directly on the rock surface in the north and south gravity dam. After the grouting, the contractor should clean or reclean the foundation prior to concreting.

.3 Should grout vent to the rock surface, the Contractor shall hand-clean the rock surface in the vicinity of any surface leak and caulk the leak with oakum or other equivalent methods subject to review by the Departmental Representative. If grout flows from cracks or joints in the rock, these shall be caulked or otherwise suitably sealed; or, at the discretion of the Departmental Representative, grouting shall be temporarily discontinued and resumed later when the initial grout has set.

.4 The Contractor should respect the environmental requirement and include in his work plan a procedure to identify and limit grout leaks in water. If grout leaks in water happen the contractor should immediately react to limit the grout leak impact including the operation of a co2 system to control water PH.

.5 All grout holes and test holes shall be drilled to the depths, and in the locations, sequence and orientations as shown on the Drawings and as directed by the Departmental Representative.

.6 All holes shall have a minimum diameter of 50 mm. The use of grease, “rod dope”, or other lubricant on drill rods will not be permitted.

.7 Core recovery will not be required from grout holes.

.8 Grout in holes shall be allowed to set for at least 24 hours prior to holes within 12 m being drilled or pressure tested (grouted).

.9 Each hole shall be protected from clogging or obstruction by means of a cap or other suitable means at the collar, and any hole that becomes clogged or otherwise obstructed before completion of the grouting operation shall either be cleaned out or another hole shall be provided by the Contractor at the Contractor’s expense.

.10 Each hole shall be thoroughly washed immediately before pressure testing or pressure grouting of the hole is initiated. Holes shall be washed out by means of alternate applications of air and water. Where percussion drilling equipment is used, washing may be done using the drill rods. Special wash rods shall be used where the drill bit or core barrel, in the opinion of the Departmental Representative, provides sufficient obstruction to the free flow of water and air so as to inhibit the washing operation. Packer seal assemblies shall be used where washing between interconnected holes is required. Holes shall be washed for a minimum of five minutes with the pump operating at full capacity or until fracture filling material ceases to be removed as shown by the clearness of the return water.

.11 Water pressure testing shall be performed to determine the sequence for grouting and to facilitate selection of the initial grout mix.

.12 Pressure tests, using clear water and at pressures up to the required grouting pressure, shall follow the pressure washing operation and be done immediately prior to pressure grouting.

.13 Single packer assemblies shall be utilized to isolate lengths of holes unless, in the opinion of the Departmental Representative, testing of any portion of the hole using double packer assemblies is required.

.14 Water pressure testing shall consist of testing the same length as the grout length. The test shall consist of one step at the required test pressure for 15 minutes with recordings at 5 minute intervals. The timing of the 15 minute duration shall commence after the pressure has stabilized to the required test pressure. The pressure to be used shall be as directed by the Departmental Representative. In general, the test pressure shall be the proposed grouting pressure.

.15 Where the water pressure test in a single stage indicates a permeability less than 3 Lugeons, the Departmental Representative may recommend that the stage need not be grouted separately but may be grouted with the next above stage.

.16 Water pressure testing shall not be permitted in any hole where the lower portion of the hole has been grouted until the grout has been allowed to set a minimum of 24 hours.

.17 Grout mixes shall be varied as directed by the Departmental Representative, to suit conditions encountered during grouting. In general, the grout mix used at the start of any section of a hole shall be A-mix. The starting mix shall be injected at the specified pressure for a ten-minute period with the grout pump operating as nearly as possible at constant speed. If the rate of absorption of grout is observed to drop steadily, the starting mix shall be continued until refusal is reached. If the absorption of solids is high during the initial period, the water-cement ratio shall be gradually decreased (A-mix to B-mix, then B-mix to C- mix, etc.), successively thicker mixes each being injected for ten-minute periods until grout consumption stabilizes or begins to decrease. At the end of each ten-minute period, the Contractor shall continue to inject any remaining grout that has already been mixed, unless directed by the Departmental Representative to waste the remaining grout. A set number of batches as determined by the Department Representative may

be substituted for the ten-minute period at the discretion of the Department Representative.

.18 Grouting pressures shall be varied to suit local conditions, as directed by the Departmental Representative, and shall be controlled to prevent surface upheaval and leakage of grout. In general, the maximum grouting pressure, as indicated by a gauge at the collar of the hole, shall be 25 kPa per metre distance from the grout stage top to the nearest rock or concrete surface. The grouting pressure of the final upper stage with the bottom of the packer at a maximum of 200 mm depth from the bedrock surface shall be 50 kPa. Where grouting is performed near bedrock cliffs, under concrete structures, or within 2 m of ground surface, grouting pressures shall, in general, be limited to low values, as directed by the Departmental Representative, that are consistent with the rock conditions and may be in the order of 10 kPa or less per metre distance to the nearest surface.

.19 During the grouting of a hole, adjacent ungrouted holes shall be left uncapped to facilitate the passage of air, water, etc. If grout is found to flow into adjacent holes, a multiple connection shall be made to the hole or holes affected, so that all such holes are grouted simultaneously. Such connections shall be made to a packer assembly which shall be set in the hole immediately above the points at which grout leaked into the hole. The contractor should be able to grout simultaneously 3 holes.

.20 Refusal criteria: Injection of grout into any hole, or portion of any hole isolated by packers, shall continue until the hole, or isolated portion of the hole, absorbs 0 L of the grout mix being injected in 5 minutes, at the maximum grouting pressure. Following the grouting of the primary, secondary and tertiary holes, additional holes will be required when a section of a tertiary hole experiences grout take in excess of 30 kg of cement (dry weight) per lineal metre of hole.

.21 After completion of a grouting operation, back pressure observations shall be made. If back pressure exists, the grout shall be retained in the hole by means of a plug or other equivalent device subject to review by the Departmental Representative until the grout has set. After grouting, each hole shall be completely filled by injection or tremieing, where necessary, with a sanded grout.

.22 Only injected grout measured at the hole flowmeter will be pay unless the Departmental

Representative accept to pay grout he especially order but not use.

.23 During grouting operations the Contractor shall take such precautions as may be necessary to prevent drill cuttings,equipment exhaust oil, wash water, and grout, from entering natural water courses or from defacing or damaging any permanent structures. The Contractor shall dispose of all waste water and grout from the operations in accordance with the Environmental Specifications in Volume 1 of this document and to the satisfaction of the Departmental Representative.

.24 During grouting operations, the Contractor will keep detailed records of the grouting operations including drilling records. The Contractor shall submit those detailed records to the Departmental Representative on a daily basis.

.19 Grouting Temperature

.1 Grouting shall not be performed into bedrock below 4 degrees Celsius. In the case of grouting performed under conditions of freezing air or near freezing temperatures, grout materials including water shall be protected from freezing and heated to a suitable temperature, as directed by the Departmental Representative. The temperature of all grout shall be between 10 and 27 degrees Celsius or as directed by the Departmental Representative, throughout the mixing and agitation period up to the time of injection.

3.2 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11- Cleaning.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Supply and installation of rip-rap for erosion protection.

1.2 RELATED REQUIREMENTS

.1 Section 31 22 13 - Rough Grading

.2 Section 31 32 19.01 - Geotextiles

.3 Section 31 23 33.01 - Excavating, Trenching and Backfilling

.4 Section 31 05 17- Aggregate Material

1.3 MEASUREMENT AND PAYMENT

.1 Payment shall be made as set out in Section 01 22 01 Measurement and Payment

1.4 REFERENCE STANDARDS

.1 Ontario Provincial Standard Specifications (OPSS) / Ontario Ministry of Transportation
  .1 OPSS.PROV 1004, November 2012 - Ontario Provincial Standard Specification, Material Specification for Aggregates - Miscellaneous.
  .2 OPSS.MUNI 1010, November 2013 – Material Specification for Aggregates - Base, Subbase, Select Subgrade and Backfill Material
  .3 OPSS.PROV 511, April 2011, Construction Specifications for Rip-Rap Rock Protection and Granular Sheeting

1.5 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00- Submittal Procedures.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Divert left over aggregate materials from landfill to local quarry for reuse as approved by departemental representative

PART 2 - PRODUCTS

2.1 STONE

.1 Rip-Rap shall be comprised of granite. Re-use of excavated material is encouraged if material is within acceptable grading and quality as specified in standards and drawings.

.2 Hard, with relative density (formally specific gravity) not less than 2.65, durable quarry stone, free from seams, cracks or other structural defects, clean with no deleterious materials, durable and resistant to weathering by air and water, non-acid generating, acceptable to the Departmental Representative. The Departmental Representative may reject any material at the stockpile, based on visual inspection, which contains excessive fines, dust or other deleterious products.

.3 Rock samples shall be submitted to the Contract Administrator for approval a minimum of five (5) days prior to their use. No rockfill will be permitted without providing the source and supplier.

2.2 GEOTEXTILE FILTER

.1 Geotextile in accordance with Section 31 32 19.20 - GEOTEXTILE.

PART 3 - EXECUTION

3.1 PLACING

.1 Where rip-rap is to be placed on slopes, excavate trench at toe of slope to dimensions as indicated.

.2 Fine grade area to be rip-rapped to uniform, even surface. Fill depressions with suitable material and compact to provide firm bed.

.3 Place geotextile on prepared surface in accordance with Section 31 32 19.20 – GEOTEXTILE and as indicated. Avoid puncturing geotextile. Vehicular traffic over geotextile not permitted.

.4 Place rip-rap to thickness and details as indicated.

.5 Place stones in manner approved by Departmental Representative to secure surface and create a stable mass. Place larger stones at bottom of slopes.

.6 Rip-rap placement shall occur from the bottom of the slope and proceed upslope.

.7 The riprap materials shall be gently placed adjacent to existing and new structures in such a manner that will not cause damage to those structures.

.8 Hand placing:

.1 Use larger stones for lower courses and as headers for subsequent courses.

.2 Stagger vertical joints and fill voids with rock spalls or cobbles.

.3 Finish surface evenly, free of large openings and neat in appearance.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 31 23 33.01 - Excavation, Trenching and Backfilling

.2 Section 03 30 00 – Cast-In-Place Concrete

.3 Section 31 23 23 – Impervious Backfill

.4 Section 31 05 16 – Aggregate Materials

1.2 REFERENCE STANDARDS

.1 Foundation treatment work shall be performed in accordance with the most current version of the following standards, except where specified otherwise.
  .1 CSA A23.1:19/A23.2:19, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
  .2 ASTM C827/C827M – 16, Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures.
  .3 COE CRD-C611-1980 Test Method for Flow of Grout Mixtures.
  .4 COE CRD-C619-1985 Corps of Owner's Engineers Specification for Grout Fluidifier for Replace – Aggregate Concrete.

1.3 MEASUREMENT AND PAYMENT PROCEDURE

.1 The dental excavation and filler concrete will be paid by m^3 see 31 23 16.26 – Rock Removal for details.

.2 All other cost related to foundation treatment including, but not limited to, scaling, cleaning, recleaning, water control and deviation must be included in the Rock Excavation or Common Excavation Unit Price. No separate payment other than for dental excavation and filler concrete will be done for foundation treatment.

.3 Sluch grout will be payed per m3 of dry cement. The sluch grout unit price payment item is included in the grouting item: m3 of dry cement.

.4 Payments related to this Section shall be as set out in Section 01 22 01 – Measurement and Payment.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Dental concrete shall be in accordance with Section 03 30 00 Cast-In-Place Concrete.

.2 Non-shrink grout shall be supplied by the Contractor (25 kg bags) for slush grouting applications.

.3 Non-shrink grout shall be supplied by the Contractor (25 kg bags) for dry pack applications.

.4 The non-shrink, premixed, sand-cement grout shall be supplied for placement under or around specified parts and shall consist of a material that can be placed at consistencies ranging from dry-pack to flowable and shall be mixed in accordance with the manufacturer's instructions. The unconfined compressive strength of 50 mm cubes, cured under standard conditions of 23±2 °C and 100% relative humidity, shall equal or exceed 42 MPa and 62 MPa at 3 days and 28 days respectively. The grout shall not stiffen rapidly and shall maintain a flowable consistency for at least 20 minutes when batched at a temperature of 23±2 °C.

.5 The Contractor shall provide the Departmental Representative with independent test data that certifies that the pre-mixed grout complies with these requirements. The data shall also indicate the shelf life of the material when stored under dry conditions.

.6 Slush grout shall be used for preparation of the bedrock surfaces that require filling of cracks. Slush grout shall be a plastic mix of non-shrink grout and water. Mix ratios shall be within the limits provided by the manufacturer to provide the appropriate flowable consistency. Mixing and application shall be done in accordance with the manufacturer's written instructions.

.7 Provide product technical specification 4 weeks before use.

PART 3 - EXECUTION

3.1 PREPARATION

.1 Rock Foundations Under concrete and Impervious Backfill

.1 The foundation must be inspected mapped and release before any concreting activity. If required, foundation treatment must be done as per the Departmental Representative request.

.2 The Contractor shall take care to minimize dust, debris, etc., created during grouting operations and prevent such materials from fouling or coating the equipment parts.

.3 Bedrock foundations forming the base for the Concrete Works and impervious Backfill shall be thoroughly cleaned of all soil, weathered rock (loose, broken, or shattered), ice, snow, and other deleterious materials remaining after excavation. All such materials shall be removed from the rock surface and from cavities, faults, potholes, and exposed open joints by barring, hand excavation, jetting with air and water, or other effective means, as accepted by the Departmental Representative.

.4 Joints, cavities, and faults shall be excavated and thoroughly cleaned to a depth equal to at least one times the width of feature, and then backfilled with dental concrete, as shown on the Drawings and directed by the Departmental Representative.

.5 Any overhanging or near vertical rock surfaces shall be filled with dental concrete to a slope of no steeper than 0.5H:1V to permit thorough compaction of earth fill and allow for maximum contact with the excavator bucket during CB Wall trench excavation. Construction and payment for dental concrete will be made under Section 03 30 00 Cast-In- Place Concrete.

.6 Holes and depressions shall be filled with dental concrete, as directed by the Departmental Representative. Construction and payment for dental concrete in holes and depressions will be made under Section 03 30 00 Cast-in-Place Concrete.

.7 Where rock surfaces on the Concrete Works or Impervious Backfill contact surface are fractured or undulating/roughened to an extent considered unsatisfactory to the Departmental Representative, a slush grout mixture shall be broomed into the cracks to smooth the final surface to accept the Concrete Works, Impervious Backfill and Class 3 Filter Material placement and result in a tight contact. Care shall be exercised to prevent accumulation of slush grout on unfractured surfaces.

.8 The Contractor shall ensure that grouting and treatment of joints, cavities, faults, and other defects in the rock will not result in layers of grout, mortar, or concrete, covering areas of sound rock.

.9 The Contractor shall maintain the working surface free from water, ice and snow. Immediately prior to placing fill, all water shall be removed from depressions. The surfaces

shall be wet, and shall be cleaned sufficiently to ensure satisfactory bond with the concrete

.10 If any previously prepared foundation surface becomes contaminated with objectionable or deleterious material, that material shall be removed, as directed by the Departmental Representative.

.11 The contractor must control and deviate the water inflow out of the foundation area. After the foundation concrete cure (min. 7 days) the water deviation pipes must be grouted with a flowable non shrink grout. The concrete repair at the pipe exit point must be done as per the concrete repair section.

.12 Foundation surface tolerance in the upstream-downstream axis is 10 % from the horizontal except were noted otherwise on the drawings. All foundation slope will need to be corrected in the rock to respect tolerances. For payment, rock foundation slope correction is considered rock excavation, not dental excavation.

3.2 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11- Cleaning.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11- Cleaning.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 31 11 00 - Clearing and Grubbing

.2 Section 31 14 13 - Soil Stripping and Stockpiling

.3 Section 32 93 43.01 - Tree Pruning

.4 Section 01 35 43 – Environmental Procedures

1.2 REFERENCES

.1 Health Canada - Pest Management Regulatory Agency (PMRA)
.1 National Standard for Pesticide Education, Training and Certification in Canada (2007).

.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
.1 Safety Data Sheets (MSDS).

.3 Department of Justice Canada (Jus)
.1 Canadian Environmental Protection Act (CEPA), 1999, c. 33.
.2 Fertilizers Act (R.S. 1985, c. F-10).
.3 Fertilizers Regulations (C.R.C., c. 666).
.4 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.

.4 Canadian Standards Association (CSA International)
.1 CSA G30.5-M1983(1998), Welded Steel Wire Fabric for Concrete Reinforcement.

1.3 DEFINITIONS

.1 Mycorrhiza: association between fungus and roots of plants. This symbiosis enhances plant establishment in newly landscaped and imported soils.

1.4 ADMINISTERATIVE REQUIREMENTS

.1 Obtain approval from Departmental Representative of schedule indicating beginning of Work.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:

.1 Provide manufacturer's instructions, printed product literature and data sheets for tree and shrub preservation materials and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Tree Preservation Plan must identify isolated and groups of trees to be preserved and provide fencing/hoarding to protect the trees. Contractor is to ensure that in protected areas there is no:

.1 Construction.

.2 Altering of grade by adding fill, trenching, scraping dumping or disturbance of any kind.

.3 Storage of construction materials, equipment, soil, construction waste or debris.

.4 No disposal of liquids, e.g. petroleum products, paints etc.

.5 Movement or parking of vehicles, machinery and equipment.

.3 Provide monthly written reports on maintenance during warranty period, to Departmental Representative identifying:

.1 Maintenance work carried out.

.2 Development and condition of plant material.

.3 Preventative or corrective measures required which are outside Contractor's responsibility.

.4 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements and 01 35 43 - Environmental Procedures.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials off ground in dry location indoors and in accordance with manufacturer's recommendations in clean, dry, well- ventilated area.

.2 Store and protect tree and shrub preservation materials from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

1.7 MAINTENANCE DURING WARRANTY PERIOD

.1 From time of acceptance by Departmental Representative to end of warranty period, perform following maintenance operations.
.1 Water to maintain soil moisture conditions for optimum growth and health of plant material without causing erosion.
.2 Apply pesticides in accordance with National Standard for Pesticide Education, Training and Certification in Canada, Federal, Provincial and Municipal regulations as and when required to control insects, fungus and disease. Obtain product approval from Departmental Representative prior to application.
.3 Apply fertilizer in early spring at manufacturer's suggested rate.
.4 Remove dead, broken or hazardous branches from plant material. Dispose of debris through mulching.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Fill:
.1 Type (A): clean, natural river sand and gravel material, free from silt, clay, loam, friable or soluble materials and organic matter.
.2 Type (B): excavated, pervious soil, free from roots, rocks larger than 75 mm, building debris, and toxic ingredients (salt, oil, etc.). Excavated material shall be approved by Departmental Representative before use as fill.

.2 Coarse washed stones: 35-75 mm diameter clean round hard stone.

.3 Peatmoss:
.1 Derived from partially decomposed species of Sphagnum Mosses.
.2 Elastic and homogeneous.
.3 Free of wood and deleterious material which could prohibit growth.
.4 Shredded minimum particle size: 5 mm.
.5 To have a natural pH and is not to be amended with lime.

.4 Fertilizer:

.1 To Canada Fertilizer Act and Fertilizers Regulations.
.2 Complete, commercial, slow release with 35% of nitrogen content in water-insoluble form.

.5 Anti-desiccant: commercial, wax-like emulsion.

.6 Filter Cloth:
.1 Type 1: 100 % non-woven needle punched
.2 polyester, 2.75 mm thick, 240 g/m2mass.
.3 Type 2: biodegradable burlap.

.7 Wood posts: 38x 38 x 2400 mm length, untreated wood.

.8 Welded wire fabric (WWF): 152 x 152 x 1500 mm, MW 18.7/MW 18.7 to GSA 30.5.

.9 Board Cladding: to consist of 50 x 100 mm lumber secured around the perimeter of tree trunks with plastic strapping or other means which will not damage the tree.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for tree and shrub preservation installation in accordance with manufacturer's written instructions.
.1 Visually inspect substrate in presence of Departmental Representative.
.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative

3.2 IDENTIFICATION AND PROTECTION

.1 Tree protection to be installed prior to the start of any on site work.

.2 Identify plants and limits of root systems to be preserved as approved by Departmental Representative.

.3 Protect plant and root systems from damage, compaction and contamination resulting from construction as approved by Departmental Representative.

.4 Ensure no root pruning is done inside drip line. If pruning inside drip line is required consult an arborist or Canadian Certified Horticultural Technician (CCHT) as approved by Departmental Representative.

3.3 TRUNK PROTECTION

.1 Install board cladding vertically around the perimeter of designated deciduous trees within the active work zone.

3.4 TRENCHING AND TUNNELING FOR UNDERGROUND SERVICES

.1 Centre line location and limits of trench/tunnel excavation to be approved by Departmental Representative prior to excavation. Tunnel excavation to extend 2000 mm from edge of trunk on either side.

.2 Excavate manually within zone of root system. Do not sever roots greater than 40 mm diameter except at greater than 500 mm below existing grade.

.3 Protect roots, and cut roots cleanly with sharp disinfected tools.

.4 Backfill for tunnel and trench to 85% Standard Proctor Density. Avoid damage to trunk and roots of tree.

3.5 PRUNING

.1 Prune in accordance with Section 32 93 43.01 - Tree Pruning.

.2 Prune crown to compensate for root loss while maintaining general form and character of plant. Dispose of debris through mulching.

3.6 ANTI-DESICCANT

.1 Apply anti-desiccant to foliage where applicable and as directed by Departmental Representative

3.7 CLEANING

.1 clean in accordance with Section 01 74 11 - Cleaning.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 This section specified topsoil, topsoil amendments, the preparation of existing grades and the placing of topsoil and finish grading.

1.2 RELATED REQUIREMENTS

.1 Section 31 11 00 - Clearing and Grubbing

.2 Section 31 14 13 - Soil Stripping and Stockpiling

.3 Section 31 22 13 - Rough Grading

.4 Section 32 01 90.33 – Tree and Shrub Preservation

1.3 MEASUREMENT AND PAYMENT

.1 Payments related to this Section shall be as set out in Section 01 22 01 – Measurement and Payment.

1.4 REFERENCE STANDARDS

.1 Agriculture and Agri-Food Canada
  .1 The Canadian System of Soil Classification, Third Edition, 1998.

.2 Canadian Council of Ministers of the Environment
  .1 PN1340-2005, Guidelines for Compost Quality.

.3 Canadian Nursery Landscape Association (CNLA)
  .1 Canadian Standards for Nursery Stock, Ninth Edition, 2017

1.5 DEFINITIONS

.1 Compost:
  .1 Mixture of soil and decomposing organic matter used as fertilizer, mulch, or soil conditioner.
  .2 Compost is processed organic matter containing 40% or more organic matter as determined by Walkley-Black or Loss On Ignition (LOI) test.
  .3 Product must be sufficiently decomposed (i.e. stable) so that any further decomposition does not adversely affect plant growth (C:N ratio below 25), and contain no toxic or growth inhibiting contaminates.
  .4 Composed bio-solids to: CCME Guidelines for Compost Quality, Category A.

1.6 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - SUBMITTAL PROCEDURES.

.2 Quality control submittals:
- .1 Soil testing: submit certified test reports showing compliance with specified performance characteristics and physical properties as described in PART 2 - SOURCE QUALITY CONTROL.
- .2 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.7 QUALITY ASSURANCE

.1 Pre-installation meetings: conduct pre-installation meeting to verify project requirements, installation instructions and warranty requirements.

.2 Landscape Contractor: to be a Member in Good Standing of Landscape Ontario and Horticultural Trades Association.

1.8 WASTE MANAGEMENT AND DISPOSAL

.1 Refer to Section 01 74 21 – CONSTRUCTION/DEMOLITION WASTE MANAGEMENT AND DISPOSAL.

PART 2 - PRODUCTS

2.1 TOPSOIL

.1 Topsoil: mixture of particulates, micro organisms and organic matter which provides suitable medium for supporting intended plant growth.
- .1 Soil texture based on The Canadian System of Soil Classification, to consist of consist of 4% organic matter for clay loams and 2% for sandy loams to a maximum of 20% by weight.
- .2 Contain no toxic elements or growth inhibiting materials.
- .3 Finished surface free from:
  - .1 Debris and stones over 50 mm diameter.
  - .2 Course vegetative material, 10 mm diameter and 100 mm length, occupying more than 2% of soil volume.
- .4 Consistence: friable when moist.

2.2 SOIL AMENDMENTS

.1 Fertilizer:

.1 A complete commercial synthetic slow release fertilizer with maximum 40% insoluble nitrogen.
.2 Formulation ratio as recommended by plant supplier.
.3 Calcium, magnesium, sulphur and micro- nutrients present in balanced ratios to support germination and/or establishment of intended vegetation.
.4 Ph value: 6.5 to 8.0.

.2 Peatmoss:
.1 Derived from partially decomposed species of Sphagnum Mosses.
.2 Elastic and homogeneous, brown in colour.
.3 Free of wood and deleterious material which could prohibit growth.
.4 Shredded particle minimum size: 5mm.

.3 Sand: washed coarse silica sand, medium to course textured.

.4 Organic matter: compost Category A, in accordance with CCME PN1340, unprocessed organic matter, such as rotted manure, hay, straw, bark residue or sawdust, meeting the organic matter, stability and contaminant requirements.

.5 Use composts meeting Category B requirements for land fill reclamation and large scale industrial applications.

.6 Limestone:
.1 Ground agricultural limestone.
.2 Gradation requirements: percentage passing by weight, 90% passing 1.0 mm sieve, 50% passing 0.125 mm sieve.

.7 Fertilizer: industry accepted standard medium containing nitrogen, phosphorous, potassium and other micro-nutrients suitable to specific plant species or application or defined by soil analysis report.

2.3 SOURCE QUALITY CONTROL

.1 Advise Departmental Representative of sources of topsoil and manufactured topsoil to be utilized with sufficient lead time for testing.

.2 Contractor is responsible for amendments to supply topsoil as specified and as per recommendations of the soil analysis report.

.3 Soil testing and analysis by recognized testing facility for pH,, nitrogen (N), phosphorus (P) and potassium (K), micronutrients, and organic matter.

.4 Testing of topsoil will be carried out by testing laboratory hired by the Contractor and approved by the Departmental Representative. The topsoil analysis test shall include an Agronomist report including recommendations for soil amendments.
.1 Soil sampling, testing and analysis to be in accordance with Provincial standards.

PART 3 - EXECUTION

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to sediment and erosion control drawings or requirements of authorities having jurisdiction, whichever is more stringent.

.2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.2 PREPARATION OF EXISTING GRADE

.1 Verify that grades are correct.
.1 If discrepancies occur, notify Departmental Representative and do not commence work until instructed by Departmental Representative.

.2 Grade soil, eliminating uneven areas and low spots, ensuring positive drainage.

.3 Remove debris, roots, branches, stones in excess of 50 mm diameter and other deleterious materials.
.1 Remove soil contaminated with calcium chloride, toxic materials and petroleum products.
.2 Remove debris which protrudes more than 75 mm above surface.
.3 Dispose of removed material off site.

.4 Cultivate entire area which is to receive topsoil to minimum depth of 150 mm.

.1 Cross cultivate those areas where equipment used for hauling and spreading has compacted soil.

3.3 PLACING AND SPREADING OF TOPSOIL/PLANTING SOIL

.1 Place topsoil after Departmental Representative has accepted subgrade.

.2 Spread topsoil in uniform layers not exceeding 150 mm.

.3 Spread topsoil to following minimum depths after settlement.
- .1 500 mm for reforestation areas.
- .2 500 mm for shrub beds
- .3 150 mm for seeded areas
- .4 135 mm for sodded areas
- .5 300 mm for flower beds

.4 Manually spread topsoil/planting soil around trees, shrubs and obstacles.

3.4 SOIL AMENDMENTS

.1 Topsoil amendment shall take place based on recommendations from the topsoil analysis report, with amendments thoroughly mixed into full specified depth of topsoil at the rates recommended in the topsoil report.

.2 For planting beds: apply and thoroughly mix soil amendments into full specified depth of topsoil at following rates:
- .1 5 part topsoil;
- .2 1 part peatmoss;
- .3 1 part organic matter.

3.5 FINISH GRADING

.1 Grade to eliminate rough spots and low areas and ensure positive drainage.
- .1 Prepare loose friable bed by means of cultivation and subsequent raking.

.2 Consolidate topsoil to required bulk density using equipment approved by Departmental Representative.
- .1 Leave surfaces smooth, uniform and firm against deep footprinting.

3.6 ACCEPTANCE

.1 Departmental Representative will inspect topsoil in place to determine acceptance of material, depth of topsoil and finish grading.

3.7 SURPLUS MATERIAL

.1 Dispose of materials not required off site as directed by Departmental Representative, at the Contractor's expense.

3.8 CLEANING

.1 Proceed in accordance with Section 01 74 11 - CLEANING.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 32 91 19 - TOPSOIL PLACEMENT AND GRADING.

1.2 MEASUREMENT AND PAYMENT PROCEDURES

.1 Payment shall be made as set out in Section 01 22 01 - MEASUREMENT AND PAYMENT and shall be included in the applicable item of work.

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, installation instructions and warranty requirements in accordance with Section 01 31 19 - PROJECT MEETINGS.

.2 Scheduling:
  .1 Schedule hydraulic seeding to coincide with preparation of soil surface.
  .2 Schedule hydraulic seeding between dates recommended by Provincial Regional Agricultural Department.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - SUBMITTAL PROCEDURES.

.2 Product Data:
  .1 Submit manufacturer's instructions, printed product literature and data sheets for seed, mulch, tackifier, fertilizer, liquid soil amendments and micronutrients.
  .2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - HEALTH AND SAFETY REQUIREMENTS and Section 01 35 46 - ARCHEOLOGICAL, CULTURAL ENVIRONMENTAL PROCEDURES.

.3 Submit in writing 7 days prior to commencing work:
  .1 Volume capacity of hydraulic seeder in liters.
  .2 Amount of material to be used per tank based on volume.
  .3 Number of tank loads required per hectare to apply specified slurry mixture per hectare.

.4 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.5 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.

1.5 QUALITY ASSURANCE

.1 Qualifications:
- .1 Landscape Contractor: to be a Member in Good Standing of Horticultural Trades Association.
- .2 Landscape Planting Supervisor: Landscape Industry Certified Technician with Softscape Installation designation.
- .3 Landscape Maintenance Supervisor: Landscape Industry Certified Technician with Turf Maintenance designation.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - COMMON PRODUCT REQUIREMENTS and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements:
- .1 Labelled bags of fertilizer identifying mass in kg, mix components and percentages, date of bagging, supplier's name and lot number.
- .2 Inoculant containers to be tagged with expiry date.

.3 Storage and Handling Requirements:
- .1 Store fertilizer off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Replace defective or damaged materials with new.

.4 Develop Waste Reduction Workplan related to Work of this Section and in accordance with Section 01 74 21 - CONSTRUCTION-DEMOLITION WASTE MANAGEMENT AND DISPOSAL.

.5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials as specified in Waste Reduction Workplan in accordance with Section 01 74 21 - CONSTRUCTION-DEMOLITION WASTE MANAGEMENT AND DISPOSAL.

1.7 WARRANTY

.1 For seeding, 12 months warranty period is extended 1 full growing season.

.2 Contractor hereby warrants that seeding will remain free of defects in accordance with General Conditions CCDC GC 12.3, but for 1 full growing season.

.3 End-of-warranty inspection will be conducted by Departmental Representative.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 All materials, including compost, to be exempt of Plastics and waste products.

.2 Seed: "Canada pedigreed grade" in accordance with Government of Canada Seeds Act and Regulations.

.1 Grass mixture: "Certified", "Canada No. 1 2 Lawn Grass Mixture" in accordance with Government of Canada "Seeds Act" and "Seeds Regulations". Seeding mix specification for Meadow Areas, Mixture composition:

.1 Silene armeria (Catchfly) 8%
.2 Aster novae-angliae (New England Aster)3%
.3 Astragalus Canadensis (Canada Milk Vetch)3%
.4 Coreopsis lanceolata (Lance Leaved Coreopsis 10%
.5 Liatris spicata (Dense Blazingstar) 5%
.6 Monarda fistulosa (Bergamot) 2%
.7 Rudbeckia hirta (Black Eyed Susan) 8%
.8 Solidago riddellii (Riddell’s Goldenrod) 3%
.9 Tradescantia ohiensis (Ohio Spidervort) 3%
.10 Verbena hastate (Blue Vervain) 8%
.11 Asclepias syriaca (Common Milkweed) 2%
.12 Andropogon gerardii (Big Bluestem) 12%
.13 Schizachyrium scoparium (Little Bluestem) 10%
.14 Elymus Canadensis (Canada Wild Rye) 13%
.15 Sorghastrum nutrans (Indian Grass) 10%

Nurse crop of Annual Oat to be seeded at rate of 250kg/ha. Ideally seed in Fall.

.2 Seeding mix specification for Wet Meadow Mixture, Mixture composition:

.1 Calamagrostis canadensis (Canada Bluejoint) 3%
.2 Poa palustris (Fowl Bluegrass) 18%
.3 Glyceria striata (Fowl Mannagrass) 10%
.4 Juncus effuses (Soft Rush) 5%
.5 Aster novae-angliae (New England Aster)
.6 Scirpus cyperinus (Wool Grass) 5%

.7 Rudbeckia hirta (Black Eyed Susan) 4%
.8 Eupatorium perfoliatum (Boneset) 2%
.9 Verbena hastate (Blue Vervain) 5%
.10 Andropogon gerardii (Big Blue Stem) 12%
.11 Elymus virginicus (Virginia Wild Rye) 18%
.12 Elymus riparius (Riverbank Wild Rye) 15%
Nurse crop of Annual Oat to be seeded at rate of 250kg/ha. Ideally seed in Fall.

Seed mix on earth dam slopes shall be applied using a blower truck with 50mm compost and tackifier.

The blown on compost & tackifier shall be placed as shown on the plans or as directed by the Departmental Representative. On areas with a slope of 1:2 or less, the blown on compost & tackifier shall be uniformly applied directly at the soil surface with a pneumatic blower as specified by seed mix supplier. Blown on compost & tackifiershall be applied at a depth of 50 mm and approximately 90 cm over the top of the slope, or overlap it into existing vegetation.

The Contractor shall maintain the blown on compost & tackifier in a functional condition at all times. Contractor shall make periodic inspections of the blown on compost & tackifier for effectiveness and shall immediately correct all deficiencies. Where deficiencies exist, additional blown on compost & tackifier material shall be installed immediately to required depth.

.3 Mulch: specially manufactured for use in hydraulic seeding equipment, non-toxic, water activated, green coloring, free of germination and growth inhibiting factors with following properties:

.1 Type I mulch:
.1 Made from wood cellulose fibre.
.2 Organic matter content: 95% plus or minus 0.5%.
.3 Value of pH: 6.0.
.4 Potential water absorption: 900%.
.2 Type II mulch:
.1 Made from newsprint, raw cotton fibre and straw, processed to produce fibre lengths of 15 mm minimum and 25 mm maximum. Greater proportions of ingredients to be straw.

.4 Tackifier: water dilutable, liquid dispersion water soluble vegetable carbohydrate powder.

.5 Water: free of impurities that would inhibit germination and growth.

.6 Fertilizer:

.1 To Canada "Fertilizers Act" and Regulations.
.2 Complete synthetic, slow release with 35% of nitrogen content in water-insoluble form.

.7 Inoculants: inoculant containers to be tagged with expiry date.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrate previously installed under other Sections or Contracts are acceptable for hydraulic seeding in accordance with manufacturer's written instructions.
.1 Visually inspect substrate in presence of Departmental Representative.
.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLERS

.1 Use installers members in Good Standing of Horticultural Trades Association.

3.3 PROTECTION OF EXISTING CONDITIONS

.1 Protect structures, signs, guide rails, fences, plant material, utilities and other surfaces not intended for spray.

.2 Immediately remove any material sprayed where not intended as directed by Departmental Representative.

3.4 PREPARATION OF SURFACES

.1 Do not perform work under adverse field conditions such as wind speeds over 10 km/h, frozen ground or ground covered with snow, ice or standing water.

.2 Fine grade areas to be seeded free of humps and hollows.
.1 Ensure areas are free of deleterious and refuse materials.

.3 Cultivated areas identified as requiring cultivation to depth of 25 mm.

.4 Ensure areas to be seeded are moist to depth of 150 mm before seeding.

.5 Obtain Departmental Representative's approval of grade and topsoil depth before starting to seed.

3.5 FERTILIZING PROGRAM

.1 Fertilizer shall comply with the provisions of the Canadian Fertilizers Act and Fertilizer Regulations.

3.6 PREPARATION OF SLURRY

.1 Measure quantities of materials by weight or weight-calibrated volume measurement satisfactory to Departmental Representative. Supply equipment required for this work.

.2 Charge required water into seeder. Add material into hydraulic seeder under agitation. Pulverize mulch and charge slowly into seeder.

.3 After materials are in seeder and well mixed, charge tackifier into seeder and mix thoroughly to complete slurry.

3.7 SLURRY APPLICATION

.1 Ensure seed is placed under supervision of certified Landscape Planting Supervisor.

.2 Hydraulic seeding equipment:
- .1 Slurry tank.
- .2 Agitation system for slurry to be capable of operating during charging of tank and during seeding, consisting of recirculation of slurry and/or mechanical agitation method.
- .3 Capable of seeding by 50 m hand operated hoses and appropriate nozzles.
- .4 Tank volume to be certified by certifying authority and identified by authorities "Volume Certification Plate".

.3 Slurry mixture applied per hectare as per manufacturer’s recommendations.

.4 Apply slurry uniformly, at optimum angle of application for adherence to surfaces and germination of seed.
- .1 Using correct nozzle for application.
- .2 Using hoses for surfaces difficult to reach and to control application.

.5 Blend application 300 mm into adjacent surfaces to form uniform surfaces.

.6 Re-apply where application is not uniform.

.7 Remove slurry from items and areas not designated to be sprayed.

3.8 CLEANING

.1 clean in accordance with Section 01 74 11 - CLEANING.

.2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 - WASTE MANAGEMENT AND DISPOSAL.
.1 Divert unused fertilizer from landfill to official hazardous material collections site approved by Departmental Representative.

3.9 PROTECTION

.1 Protect seeded areas from trespass until plants are established.

.2 Remove protection devices as directed by Departmental Representative.

3.10 MAINTENANCE DURING ESTABLISHMENT PERIOD

.1 Ensure maintenance is carried out under supervision of certified Landscape Maintenance Supervisor.

.2 Perform following operations from time of seed application until acceptance by Departmental Representative.

.3 Meadow Mixture:
.1 Repair and reseed dead or bare spots to allow establishment of seed prior to acceptance.
.2 Meadow areas to left to grow in a naturalized state. Mowing to take place only once at the end of the growing season. Remove clippings as directed by Departmental Representative.
.3 Control weeds by mechanical or chemical means utilizing acceptable integrated pest management practices and in accordance with all applicable By-Laws.
.4 Water seeded area to maintain optimum soil moisture level for germination and continued growth of meadow mixture. Control watering to prevent washouts.

3.11 ACCEPTANCE

.1 Seeded areas will be accepted by Departmental Representative provided that:

.1 Plants are uniformly established. Seeded areas are free of rutted, eroded, bare or dead spots.
.2 Areas have been mown at least once.

.2 Areas seeded in fall will achieve final acceptance in following spring, one month after start of growing season provided acceptance conditions are fulfilled.

3.12 MAINTENANCE DURING WARRANTY PERIOD

.1 Perform following operations from time of acceptance until end of warranty period:
.1 Repair and reseed dead or bare spots to satisfaction of Departmental Representative.
.2 Mow seeded areas only at the end of the growing season, removing clippings that will smother vegetated areas, as directed by Departmental Representative.

END OF SECTION

PART 1 - GENERAL

.1 This Section specifies sod, sod placement, preparation and maintenance.

1.2 RELATED REQUIREMENTS

.1 Section 31 14 13 – Soil Stripping and Stockpiling

.2 Section 31 22 13 - Rough Grading

.3 Section 32 91 19.13 - Topsoil Placement and Grading

1.3 MEASUREMENT AND PAYMENT

.1 Payments related to this Section shall be as set out in Section 01 22 01 – Measurement and Payment.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Scheduling:

.1 Schedule sod laying to coincide with preparation of soil surface.
.2 Schedule sod installation when frost is not present in ground.
.3 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, installation instructions and warranty requirements in accordance with Section 01 31 19 - Project Meetings.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for sod, geotextile and fertilizer and include product characteristics, performance criteria, physical size, finish and limitations
.2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 43- Environmental Procedures and 35 29.06- Health and Safety Requirements.

.3 Samples.

.1 Obtain approval of samples by Departmental Representative.

.4 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements of seed mix, seed purity, and sod quality.

.5 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties of seed mix, seed purity, and sod quality.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Deliver and unload sod on pallets.

.4 Deliver sod within 24 hours of being lifted and lay sod within 36 hours of being lifted.

.5 Dry, frozen, dead, irregular or broken sod will not be accepted.

.6 Storage and Handling Requirements:
.1 Store materials in accordance with supplier's recommendations.
.2 Replace defective or damaged materials with new.

.7 Packaging Waste Management: remove for recycle and reuse of pallets, padding, crates, and packaging materials as specified in Waste Reduction Workplan in accordance with Section 01 74 21 - Construction/ Demolition Waste Management and Disposal.

PART 2 - PRODUCTS

.1 Number One Turf Grass Nursery Sod: sod that has been especially sown and cultivated in nursery fields as turf grass crop.
.1 Turf Grass Nursery Sod types:

.1 Number One Kentucky Bluegrass Sod: Nursery Sod grown solely from seed of cultivars of Kentucky Bluegrass, containing not less than 50% Kentucky Bluegrass cultivars.
.2 Number One Kentucky Bluegrass Sod - Fescue Sod: Nursery Sod grown solely from seed mixture of cultivars of Kentucky Bluegrass and Chewing Fescue or Creeping Red Fescue, containing not less than 40% Kentucky Bluegrass cultivars and 30% Chewing Fescue or Creeping Red Fescue cultivars.
.3 Number One Named Cultivars: Nursery Sod grown from certified seed.

.2 Turf Grass Nursery Sod quality:
.1 Not more than 1 broadleaf weed and up to 1% native grasses per 40 square metres.
.2 Density of sod sufficient so that no soil is visible from height of 1500 mm when mown to height of 50 mm.
.3 Mowing height limit: 35 to 65 mm.
.4 Soil portion of sod: 6 to 15 mm in thickness.

.3 Commercial Grade Turf Grass Nursery:
.1 Mow sod at height directed by Departmental Representative within 36 hours prior to lifting, and remove clippings.
.2 Not more than 5 broadleaf weeds and up to 20% native grasses per 40 square metres.

.4 Sod establishment support:
.1 .1 Biodegradable starch pegs: 17 x 8 x 200 mm.

.5 Fertilizer:
.1 To Canada "Fertilizers Act" and Fertilizers Regulations.
.2 Complete, synthetic, slow release with 65% of nitrogen content in water-insoluble form.

2.2 SOURCE QUALITY CONTROL

.1 Obtain written approval from Departmental Representative of sod at source.

.2 When proposed source of sod is approved, use no other source without written authorization from Departmental Representative.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or

Contracts are acceptable for sod installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 PREPARATION

.1 Verify that grades are correct and prepared in accordance with Section 32 91 19.13- Topsoil Placement and Grading. If discrepancies occur, notify Departmental Representative and commence work when instructed by Departmental Representative.

.2 Do not perform work under adverse field conditions such as frozen soil, excessively wet soil or soil covered with snow, ice, or standing water.

.3 Fine grade surface free of humps and hollows to smooth, even grade, to contours elevations indicated, to tolerance of plus or minus 15 mm for Commercial Grade Turf Grass Nursery and plus or minus 8 mm, for Turf Grass Nursery Sod, surface to drain naturally.

.4 Remove and dispose of weeds; debris; stones 50 mm in diameter and larger; soil contaminated by oil, gasoline and other deleterious materials; off site in location as directed by Departmental Representative in accordance with Section 01 74 21- Construction/Demolition Waste Management And Disposal.

3.3 SOD PLACEMENT

.1 Ensure sod placement is done under supervision of certified Landscape Planting Supervisor.

.2 Lay sod within 24 hours of being lifted if air temperature exceeds 20 degrees C.

.3 Lay sod sections in rows, joints staggered. Butt sections closely without overlapping or leaving gaps between sections. Cut out irregular or thin sections with sharp implements.

.4 Roll sod as directed by Departmental Representative. Provide close contact between sod and soil by light rolling. Use of heavy roller to correct irregularities in grade is not permitted.

3.4 SOD PLACEMENT ON SLOPES AND PEGGING

.1 Install and secure geotextile fabric in areas indicated, in accordance with manufacturer's instructions.

.2 Start laying sod at bottom of slopes.

.3 Peg sod on slopes steeper than 3 horizontal to 1 vertical, within 1 m of catch basins and within 1m of drainage channels and ditches to following pattern:
- .1 100 mm below top edge at 200 mm on centre for first sod sections along contours of slopes.
- .2 Not less than 3-6 pegs per square metre.
- .3 Not less than 6-9 pegs per square metre in drainage structures. Adjust pattern as directed by Departmental Representative.
- .4 Drive pegs to 20 mm above soil surface of sod sections.

3.5 FERTILIZING PROGRAM

.1 Fertilize during establishment and warranty periods to the requirements of the requirements of the certified landscape contractor and to the following program: Place fertilizer on topsoil prior to laying sod.

3.6 PROTECTION BARRIERS

.1 Protect newly sodded areas from deterioration with snow fence on rigid frame as directed by Departmental Representative.

.2 Remove protection after inspection as directed by Departmental Representative.

3.7 MAINTENANCE DURING ESTABLISHMENT PERIOD

.1 Perform following operations from time of installation until acceptance.
- .1 Water sodded areas in sufficient quantities and at frequency required to maintain optimum soil moisture condition to depth of 75 to 100mm.
- .2 Cut grass to 50mm when or prior to it reaching height of 75mm.
- .3 Maintain sodded areas weed free to 95% of surfaces.
- .4 Fertilize areas in accordance with fertilizing program. Spread half of required amount of fertilizer in one direction and remainder at right angles and water in well.
- .5 Temporary barriers or signage to be maintained where required to protect newly established sod.

3.8 ACCEPTANCE

.1 Turf Grass Nursery Sod areas will be accepted by Departmental Representative provided that:
  .1 Sodded area are properly established
  .2 Sod is free of bare and dead spots.
  .3 No surface soil is visible from height of 1500 mm when grass has been cut to height of 50mm.
  .4 Sodded areas have been cut minimum 2 times prior to acceptance.

.2 Sodded Commercial Grade Turf Grass Nursery Sod areas will be accepted by Departmental Representative provided that:
  .1 Sodded areas are properly established.
  .2 Extent of surface soil visible when grass has been cut to height of 60 mm is acceptable.
  .3 Sod is free of bare or dead spots and extent of weeds apparent in grass is acceptable.
  .4 Sodded areas have been cut minimum 2 times prior to acceptance.
  .5 Fertilizing in accordance with fertilizer program has been carried out at least once.

.3 Areas sodded spring one month after start of growing season provided acceptance conditions are fulfilled.

.4 When environmental conditions allow, all sodded areas showing shrinkage cracks shall be top-dressed and seeded with a seed mix matching the original.

.5 Areas sodded in fall will be accepted in following spring one month after start of growing season provided acceptance conditions are fulfilled.in fall will be accepted in following

3.9 MAINTENANCE DURING WARRANTY PERIOD

.1 Perform following operations from time of acceptance until end of warranty period:
  .1 Water sodded Turf Grass Nursery Sod and Commercial Grade Turf Grass Nursery Sod areas at weekly intervals to obtain optimum soil moisture conditions to depth of 100mm.

.2 Repair and re-sod dead or bare spots to satisfaction of Departmental Representative Consultant.

.3 Cut grass and remove clippings that will smother grass as directed by Departmental Representative to height as follows:
  .1 Turf Grass Nursery Sod:
    .1 50 mm during normal growing conditions.
  .2 Commercial Grade Turf Grass Nursery Sod:

.1 60 mm during normal growing conditions.

.3 Cut grass at 2 week intervals or as directed by Departmental Representative but at intervals so that approximately one third of growth is removed in single cut.

.4 Fertilize areas in accordance with fertilizing program. Spread half of required amount of fertilizer in one direction and remainder at right angles and water in well.

.5 Eliminate weeds by mechanical chemical means to extent acceptable to Departmental Representative.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 31 11 00 - Clearing and Grubbing

.2 Section 32 01 90.33 - Tree and Shrub Preservation.

.3 Section 32 91 19.13 - Topsoil Placement and Grading.

1.2 REFERENCES

.1 Agriculture and Agri-Food Canada (AAFC).
  .1 Plant Hardiness Zones in Canada 2000.

.2 Canadian Nursery Landscape Association (CNLA)
  .1 Canadian Nursery Stock Standard (9th Edition)-2017.

.3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  .1 Safety Data Sheets (SDS).

1.3 DEFINITIONS

.1 Mycorrhiza: association between fungus and roots of plants. This symbiosis enhances plant establishment in newly landscaped and imported soils.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Scheduling: obtain approval from Departmental Representative of schedule five (5) days in advance of shipment of plant material.

.2 Schedule to include:
  .1 Date for selection of plant material or representative sample at source by Departmental Representative.
  .2 Quantity, species, size, and condition of plant material.
  .3 Shipping dates.
  .4 Arrival dates on site.
  .5 Planting Dates.
  .6 Removal for replanting of collected (transplanted) native stock

.3 Representative to identify existing trees and shrubs to be removed, stored and transplanted.
    .1 Contractor shall retain a licensed arborist to inspect plant materials, to oversee removal to storage area, including

establishing storing conditions, confirming condition and quality prior to transplanting, and transplanting operation.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - SUBMITTAL PROCEDURES.

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for ground cover, fertilizer, mycorrhiza, anti-desiccant, anchoring equipment, and mulch and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - HEALTH AND SAFETY REQUIREMENTS and 01 35 43 - ARCHEOLOGICAL, CULTRUAL AND ENVIRONMENTAL PROCEDURES.

.3 Submit sample of Mulch to the Departmental Representative for approval.

1.6 QUALITY ASSURANCE

.1 Qualifications:
- .1 Landscape Contractor: to be a Member in Good Standing of Landscape Ontario and Horticultural Trades Association.
- .2 Landscape Planting Supervisor: Landscape Industry Certified Technician with Softscape Installation designation.
- .3 Landscape Maintenance Supervisor: Landscape Industry Certified Technician with Ornamental Maintenance designation.
- .4 Contractor shall retain a licensed arborist to inspect plant materials, to oversee removal to storage area, including establishing storing conditions, confirming condition and quality prior to transplanting, and transplanting operation.

.2 Provide name of plant material supplier and obtain approval from Departmental Representative of plant material at source prior to shipping to site.

.3 Provide documentation from source, but not limited to:

- .1 Authenticating seed source from which nursery stock was grown.
- .2 Region from which stock has been imported.

.4 Arrange for inspection of plant stock upon arrival to site. All rejected plant material shall be removed from project site immediately upon rejection by the Departmental Representative. Replace any damaged stock with new undamaged material as directed by Departmental Representative.

.5 Collected stock: Only trained individual may collect wild stock. Collected native plant material use is acceptable only upon written approval of the Department Representative. Provide documentation regarding source of stock to include but not limited to:
.1 Collecting Agent qualifications
.2 Source of stock
.3 Date of collection
.4 Number of transplants prior to planting in final location

1.7 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - COMMON PRODUCT REQUIREMENTS.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address. Plant labels shall remain on plants until inspection and approval by the Departmental Representative.
.1 Protect plant material from frost, excessive heat, wind and sun during delivery.
.2 Protect plant material from damage during transportation:
.1 Delivery distance is less than 30 km and vehicle travels at speeds under 80 km/h, tie tarpaulins around plants or over vehicle box.
.2 Delivery distance exceeds 30 km or vehicle travels at speeds over 80 km/h, use enclosed vehicle where practical.
.3 Protect foliage and root balls using anti-desiccants and tarpaulins, where use of enclosed vehicle is impractical due to size and weight of plant material.

.3 Storage and Handling Requirements:
.1 Immediately store and protect plant material which will not be installed within 1 hour of arrival at site, in accordance with supplier's written recommendations in storage location approved by Departmental Representative.
.2 Protect stored plant material from frost, wind and sun and as follows:

.1 For bare root plant material, preserve moisture around roots by heeling-in or burying roots in topsoil and watering to full depth of root zone.
.2 For pots and containers, maintain moisture level in containers. Heel-in fibre pots.
.3 For balled and burlapped and wire basket root balls, place to protect branches from damage. Maintain moisture level in root zones.

.3 Store and manage hazardous materials in accordance with site specific EMP (Hazardous Materials Management Plan) and manufacturer's written instructions.

.4 Site-Specific EMP (Waste Management Plan) to encompass Work of this Section.

1.8 WARRANTY

.1 For plant material as itemized on plant list (provided by the Contractor in the EMP, approved by the Departmental Representative) the 12 months warranty period is extended to 24 months.

.2 End-of-warranty inspection will be conducted by Departmental Representative.

.3 Departmental Representative reserves the right to extend Contractor's warranty responsibilities for an additional one year if, at end of initial warranty period, leaf development and growth is not sufficient to ensure future survival and vigorous growth.

.4 The Contractor will provide warranty equal to the initial warranty on any material that fails within the warranty period and is replaced.

PART 2 - PRODUCTS

2.1 PLANT MATERIAL

.1 Type of root preparation, sizing, grading and quality: comply to Canadian Nursery Stock Standard.
.1 Source of plant material: grown in Zone 4b or colder in accordance with Plant Hardiness Zones in Canada.
.2 Plant material must be planted in zone specified as appropriate for its species.
.3 Plant material in location appropriate for its species.

.2 Plant material: free of disease, insects, defects or injuries and structurally sound with strong fibrous root system.

.3 Trees: with straight trunks, well and characteristically branched for species.

.4 Trees larger than 200 mm in caliper: half root pruned during each of two successive growing seasons, the latter at least one growing season before arrival on site.

.5 Bare root stock: nursery grown, in dormant stage, not balled and burlapped or container grown.

.6 Collected stock: maximum 40 mm in caliper, with well-developed crowns and characteristically branched; no more than 40% of overall height may be free of branches.

.1 During collection, ensure 10% maximum seed crop (or plants) are collected from healthy population of many individuals, and from several plants of same species.

.2 Leave remainder for natural dispersal and as food for dependent organisms.

2.2 WATER

.1 Free of impurities that would inhibit plant growth.

2.3 STAKES

.1 T-bar, steel, 40 x 40 x 5 x 2440 mm or Wood, pointed one end, 38 x 38 x 2300 mm.

2.4 GUYING WIRE

.1 Type 1: steel, 3 mm wire.

.2 Type 2: 1.5 mm diameter multi-wire steel cable, minimum 3 strands for trees 150 – 50 mm caliper

2.5 CLAMPS

.1 U-bolt: galvanized, 13 mm diameter, c/w curved retaining bar and hex nuts.

.2 Crimp type.

2.6 GUYING COLLAR

.1 Tube: rubber 13 mm diameter.

2.7 MULCH

.1 Shredded wood: varying in size from 25 to 125 mm in length, from coniferous trees.

2.8 FERTILIZER

.1 Synthetic commercial type as recommended by agronomist report in soil analysis report.
  .1 Ensure new root growth is in contact with mycorrhiza.
  .2 Use mycorrhiza as recommended by manufacturer's written recommendations and soil analysis report.

2.9 ANTI-DESICCANT

.1 Wax-like emulsion.

2.10 FLAGGING TAPE

.1 Fluorescent, orange colour.

2.11 SOURCE QUALITY CONTROL

.1 Obtain approval from Departmental Representative of plant material prior to planting.

.2 Imported plant material must be accompanied with necessary permits and import licenses. Conform to Federal, Provincial or Territorial regulations.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrate previously installed under other Sections or Contracts are acceptable for planting installation in accordance with manufacturer's written instructions.
  .1 Visually inspect substrate in presence Departmental Representative.
  .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  .3 Proceed with installation only after unacceptable conditions have been remedied [and after receipt of written approval to proceed from Departmental Representative.

3.2 PRE-PLANTING PREPARATION

.1 Proceed only after receipt of written acceptability of plant material from Departmental Representative.

.2 Remove damaged roots and branches from plant material.

.3 Apply anti-desiccant to conifers and deciduous trees in leaf in accordance with manufacturer's instructions.

.4 Locate and protect utility lines.

.5 Temporary Erosion and Sedimentation Control:
- .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of site specific EMP.
- .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

.6 Placement of topsoil over disturbed lands shall be undertaken to provide a suitable growing medium for revegetation plant species and site conditions. Most of the soil to be used for this purpose should come from on-site topsoil stockpiles retained from stripping and grubbing.

.7 To the extent practicable, soil should not be screened in order to retain soil structure.

.8 Notify and acquire written acknowledgement from utility authorities before beginning excavation of planting pits for trees and shrubs.

3.3 EXCAVATION AND PREPARATION OF PLANTING BEDS

.1 Establishment of sub-grade for planting beds in accordance with Section 31 22 13- Rough Grading.

.2 Topsoil to be placed according to 32 91 19.13 TOPSOIL SUPPLY, PLACEMENT AND GRADING.

.3 For individual planting holes:

.1 Stake out location and obtain approval from Departmental Representative prior to excavating.
.2 Excavate to depth and width as indicated.
.3 Remove rocks, roots, debris and toxic material from excavated material that will be used as planting soil for trees and individual shrubs. Dispose of excess material off-site at the Contractor's expense.
.4 Scarify sides of planting hole.
.5 Remove water which enters excavations prior to planting. Notify Departmental Representative if water source is ground water.

3.4 PLANTING

.1 Native species are to be used for ground cover/plantings with mulch to prevent erosion and to help seeds germinate. If there is insufficient time remaining in the growing season, the site should be stabilized (e.g., cover exposed areas with erosion control blankets to keep the soil in place and prevent erosion) and vegetated the following spring.

.2 For bare root stock, place minimum 100 mm backfill soil in bottom of hole.
.1 Plant trees and shrubs with roots placed over soil straight out in hole in direction of natural root growth to discourage girdling / circling roots.

.3 For jute burlapped root balls, cut away top one third of wrapping and wire basket without damaging root ball.
.1 Do not pull burlap or rope from under root ball.

.4 For container stock or root balls in non-degradable wrapping, remove entire container or wrapping without damaging root ball.

.5 Plant vertically in locations as indicated.
.1 Orient plant material to give best appearance in relation to structure, roads and walks.
.2 Locate root flare and ensure that it is aligned with finished soil level.

.6 For trees and shrubs:
.1 Backfill soil in 150 mm lifts.
.1 Tamp each lift to eliminate air pockets.
.2 When two thirds of depth of planting pit has been backfilled, fill remaining space with water.
.3 After water has penetrated into soil, backfill to finish grade.
.2 Form watering saucer to hold water around top of planting area.

.7 For ground covers, backfill soil evenly to finish grade and tamp to eliminate air pockets.

.8 Water plant material thoroughly.

.9 After soil settlement has occurred, fill with soil to finish grade.

3.5 TRUNK PROTECTION

.1 Install trunk protection on deciduous trees (as per details provided by Contractor in Site Restoration Plan, and approved by Departmental Representative).

.2 Install trunk protection before installation of tree supports.

3.6 TREE SUPPORTS

.1 Install tree supports as indicated.

.2 Use single stake tree support for deciduous trees less than 3 m in height and evergreens less than 2 m in height
- .1 Place stake on prevailing wind side and 150 mm minimum from trunk.
- .2 Drive stake 150 mm minimum into undisturbed soil beneath roots.
  - .1 Ensure stake is secure, vertical and unsplit.
- .3 Install 150 mm long guying collar 1500 mm above grade.
- .4 Thread Type 1 guying wire through guying collar tube.
  - .1 Twist wire to form collar and secure firmly to stake. Cut off excess wire.

.3 Use 3 guy wires and anchors for deciduous trees greater than 3m in height and evergreens greater than 2 m in height.
- .5 Use Type 2 guying wire with clamps for trees less than 75 mm in diameter and Type 3 guying wire with clamps for trees greater than 75 mm in diameter.
- .6 Use Type 1 anchors for trees less than 75 mm in diameter and Type 2 anchors for trees greater than 75 mm in diameter.
- .7 Install guying collars above branch to prevent slipping at approximately 2/3 height for evergreens and 1/2 height for deciduous trees. Collar mounting height not to exceed
- .8 2.5 m above grade.
- .9 Guying collars to be of sufficient length to encircle tree plus 50 mm space for trunk clearance. Thread guy wire through collar encircling tree trunk and secure to lead wire by

clamp or multi-wraps; cut wire ends close to wrap. Spread lead wires equally proportioned about trunk at 120 degrees.

.10 Install anchors at equal intervals about tree and away from trunk so guy wire will form 45 degree angle with ground. Install anchor at angle to achieve maximum resistance for guy wire.

.11 Attach guy wire to anchors. Tension wire and secure by installing clamps.

.12 Install wire tightener ensuring that guys are secure and leave room for slight movement of tree.

.13 Saw tops off wooden anchors which extend in excess of 100 mm above grade or as directed by Departmental Representative.

.3 After tree supports have been installed, remove broken branches with clean, sharp tools.

.4 Install flagging tape to guys as indicated.

3.7 MULCHING

.1 Ensure soil settlement has been corrected prior to mulching.

.2 Following approval by the Departmental Representative of submitted mulch sample, install mulch as specified in the approved Site Restoration Plan.

3.8 MAINTENANCE DURING ESTABLISHMENT PERIOD

.1 Perform following maintenance operations from time of planting to acceptance by Departmental Representative.

.1 Water to maintain soil moisture conditions for optimum establishment, growth and health of plant material without causing erosion.

.1 For evergreen plant material, water thoroughly in late fall prior to freeze-up to saturate soil around root system.

.2 Remove weeds monthly.

.3 Replace or re-spread damaged, missing or disturbed mulch.

.4 For non-mulched areas, cultivate as required to keep top layer of soil friable.

.5 If required to control insects, fungus and disease, use appropriate control methods in accordance with Federal, Provincial and Municipal regulations. Obtain product approval from Departmental Representative prior to application.

.6 Remove dead or broken branches from plant material.

.7 Keep trunk protection and guy wires in proper repair and adjustment.
.8 Remove and replace dead plants and plants not in healthy growing condition. Make replacements in same manner as specified for original plantings.

3.9 MAINTENANCE DURING WARRANTY PERIOD

.1 From time of acceptance by Departmental Representative to end of warranty period, perform following maintenance operations.
.1 Water to maintain soil moisture conditions for optimum growth and health of plant material without causing erosion.
.2 Reform damaged watering saucers.
.3 Remove weeds monthly.
.4 Replace or respread damaged, missing or disturbed mulch.
.5 For non-mulched areas, cultivate monthly to keep top layer of soil friable.
.6 If required to control insects, fungus and disease, use appropriate control methods in accordance with Federal, Provincial and Municipal regulations. Obtain product approval from Departmental Representative prior to application.
.7 Apply fertilizer in early spring as indicated by soil test.
.8 Remove dead, broken or hazardous branches from plant material.
.9 Keep trunk protection and tree supports in proper repair and adjustment.
.10 Remove trunk protection, tree supports and level watering saucers at end of warranty period.
.11 Remove and replace dead plants and plants not in healthy growing condition. Make replacements in same manner as specified for original plantings.
.12 Submit monthly written reports to Departmental Representative identifying:
.1 Maintenance work carried out.
.2 Development and condition of plant material.
.3 Preventative or corrective measures required which are outside Contractor's responsibility.

3.10 CLEANING

.1 clean in accordance with Section 01 74 11 - CLEANING.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - CLEANING.

.3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 – CONSTRUCTION/DEMOLITION WASTE MANAGEMENT AND DISPOSAL and site specific EMP.

.1 Divert discarded burlap, wire and plastic plant containers materials from landfill to plastic recycling facility approved by Departmental Representative.

.2 Dispose of unused fertilizer at official hazardous material collection site approved by Departmental Representative.

.3 Dispose of unused anti-desiccant at official hazardous material collections site approved by Departmental Representative.

.4 Divert unused wood and mulch materials from landfill to facility approved by Departmental Representative.

3.11 CLOSEOUT ACTIVITIES

.1 Submit maintenance reports for trees, shrubs, and other plantings.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Work under this covers tree pruning of existing trees that are to remain, but where branches and limbs may be damaged due to the undertaking of the work under this contract.

1.2 MEASUREMENT PROCEDURES

.1 Payments related to this Section shall be as set out in Section 01 22 01 – Measurement and Payment.

1.3 REFERENCE STANDARDS

.1 American National Standard Institute (ANSI)
  .1 ANSI A300 (Part 1)-2017, Tree Care Operations
  .2 Tree, Shrub and Other Woody Plant Maintenance - Standard Practices (revision and re-designation of ANSI A300-1995) (includes supplements).
  .3 ANSI A300 (Part 2)-2018, Tree Care Operations
  .4 Tree, Shrub, and Other Woody Plant Maintenance - Standard Practices - Part 2 - Fertilization.
  .5 ANSI A300 (Part 3)-2013, Tree Care Operations
  .6 Tree, Shrub and Other Woody Plant Maintenance: Standard Practices - Part 3 - Tree Support Systems (a. Cabling, Bracing, and Guying) (supplement to ANSI A300-1995).

.2 Canadian Nursery Landscape Association (CNLA)
  .1 Canadian Nursery Stock Standard (9th Edition)-2017.

.3 International Society of Arboriculture (ISA)

.4 Ontario Ministry of Agriculture, Food and Rural Affairs
  .1 Publication 483-2008, Pruning Ornamentals

1.4 DEFINITIONS

.1 Crown Cleaning: consists of selective removal of one or more of following items: dead, dying or diseased branches, weak branches and water sprouts

.2 Crown Thinning: consists of selective removal of branches to increase light penetration, air movement and reduce weight.

.3 Crown Raising: consists of removal of lower tree branches to provide clearance.

.4 Crown Reduction or Crown Shaping: decreases tree height and/or spread.

.5 Vista Pruning: is selective thinning of framework limbs or specific crown areas to improve views.

.6 Crown Restoration: improves structure, form and appearance of trees that have been severely headed or vandalized.

1.5 QUALITY ASSURANCE

.1 Certification: provide International Society of Arboriculture for people performing pruning operations.

.2 Regulatory requirements: provide safety certificate as approved by local hydro utility where pruning work will take place within 1 metre of overhead energized conductors.

.3 Acceptance of Work will be determined by Departmental Representative from field sample.

.4 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29.06- Health and Safety Requirements.

1.6 TOOL MAINTENANCE

.1 Ensure that tools are clean and sharp throughout pruning operation: do not use tools that crush or tear bark.

.2 Disinfect tools before each tree is pruned.

.3 On diseased plant material disinfect tools before each cut.

1.7 WARRANTY

.1 For seeding, 12 months warranty period is extended to 24 months (1 full growing season).

.2 End-of-warranty inspection will be conducted by Departmental Representative.

PART 2 - PRODUCTS

2.1 DISINFECTANT

.1 20% solution of sodium hypochlorite or 70% solution of ethyl alcohol.

PART 3 - EXECUTION

3.1 APPLICATION

.1 Manufacturer's instructions: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 GENERAL

.1 Prune in accordance with Pruning Ornamentals and ANSI A300, and as directed by Departmental Representative. Where discrepancies occur between standard and specifications, specifications govern.

.2 Notify immediately Departmental Representative conditions detrimental to health of plant material or operations.

.3 Prune during plant dormant period or after leaves have matured. Avoid pruning during leaf formation, at time of leaf fall, or when seasonal temperature drops below minus 10 degrees C.

.4 Prune trees that are heavy bleeders, Acer, Betula, Gleditsia, Tilia ,Ulmus and Populus when in full leaf.

.5 Minimize pruning work in order to retain natural form and shape of plant species.

.6 Do not:
.1 Flush cut branches.
.2 Crush or tear bark.
.3 Cut behind branch bark ridge.
.4 Damage branch collars.
.5 Damage branches to remain.

3.3 PRUNING

.1 Remove dead, dying, diseased and weak growth from plant material to provide Departmental Representative in order to promote healthy growth.

.2 Remove live branches that:
.1 Interfere with healthy development and structural strength including branches crossed or rubbing more important branches.
.2 Are of weak structure including narrow crotches.
.3 Obstruct development of more important branches.
.4 Are broken.

.3 Remove live branches to re-establish natural species form including:
.1 One or more developing leaders.
.2 Multiple growth due to previous topping.
.3 Branches extending outward from natural form.
.4 Undesirable sucker growth.

.4 Remove loose branches, twigs and other debris lodged in tree.

.5 Remove vines.

.6 For branches under 25 mm in diameter:
.1 Locate branch bark ridge and make cuts smooth and flush with outer edge of branch collar to ensure retention of branch collar. Cut target area to bottom of branch collar at angle equal to that formed by line opposite to branch bark ridge.

.7 For branches greater than 25mm in diameter:
.1 Make first cut on lower side of branch 300 mm from trunk, one third diameter of branch.
.2 Make second cut on upper side of branch 500 mm from trunk until branch falls off.
.3 Make final cut adjacent to and outside branch collar.

.8 Ensure that trunk bark and branch collar are not damaged or torn during limb removal.
.1 Repair areas which are damaged, or remove damaged area back to next branch collar.

.9 Remove additional growth designated by Departmental Representative.

.10 For branches and/or roots damaged by construction activity provide clean cuts to near undamaged portion of healthy material to satisfaction of the Departmental Representative.

3.4 ROOT GIRDLING

.1 For girdling roots one-quarter size of trunk diameter or larger, V-cut girdling root one-half way through at point where root is crossing.

.2 Remove exposed portion of girdling root as directed by Departmental Representative after cleanly cutting root flush with grade on each side of parent root. Do not injure bark or parent root.

3.5 CARE OF WOUNDS

.1 Shape bark around wound to oblong configuration ensuring minimal increase in wound size. Retain peninsulas of existing live bark.

3.6 CLEAN-UP

.1 Proceed in accordance with Section 01 74 11- Cleaning.

END OF SECTION

PART 1 - GENERAL

1.1 DESCRIPTION

.1 This section covers the requirements for the design, sizing, supply and installation of the stoplog lifting machine rails on both the new and existing dam including, soleplates, rail clips and joint bars, hook bolts, stops and their assembly anchors and bolts.

1.2 RELATED REQUIREMENTS

.1 Section 05 50 00 – METAL FABRICATIONS

1.3 REFERENCES

.1 ASTM International
  .1 ASTM A1 – 00 (2018), Standard Specification for Carbon Steel Tee Rails.
  .2 ASTM A3 – 01 (2019), Standard Specification for Steel Joint Bars, Low, Medium, and High Carbon (Non-Heat-Treated).
  .3 ASTM F3125/F3125M – 19, Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength.
  .4 ASTM A193/A193M – 19, Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications.
  .5 ASTM A563 – 15, Standard Specification for Carbon and Alloy Steel Nuts.
  .6 ASTM A759 – 10 (2016), Standard Specification for Carbon Steel Crane Rails.

1.4 SUBMITTALS

.1 Design calculations
  .1 Submit for review by the Departmental Representative all design calculations for the selection and sizing of the rails and their accessories.

.2 Drawings
  .1 The drawings attached to the tender documents are not intended to be "shop" or "working" drawings. Sizes and/or arrangements shown are only intended to illustrate a feasible engineering solution to the requirements of this specification. The Contractor is expected to adopt a design meeting the same requirements and

be fully responsible for the equipment supplied in every respect.

.2 Submit for review by the Departmental Representative all shop and field assembly drawings sealed by a professional engineer licensed to practice in Ontario.

.3 Show on shop drawings details of all components, bills of materials, heat treatment, sizes of welds (if applicable) and other connections, tolerances, surface preparation, and any other relevant information as applicable.

.4 Show on shop drawings actual fit up sizes and revisions encountered during shop and field assembly.

.5 On the bills of materials state all identification trade names and model numbers of purchased items.

.3 Submit for review by the Departmental representative, all mill test certificates for the material supplied.

.4 Submit for review by the Departmental Representative all handling and erection instructions and procedures of the equipment and material supplied.

.5 Provide "as-built" drawings.

.6 Seal and sign all calculations, drawings, and Test Procedures by professional engineers licensed to practice in Ontario.

1.5 QUALITY ASSURANCE

.1 The Contractor is responsible for quality control:

.2 Engage the service of 3rd party inspectors to perform the installation inspection.

.3 Submit copies of all inspection reports.

PART 2 - PRODUCTS

2.1 RAILS

.1 Standard carbon steel tee rails in conformity to ASTM A1 Standard or crane rails ASTM A759 recommended by gantry supplier. Mill Test & Brinell hardness test requirements for standard carbon rails.

.1 Rail section geometries:

.1 For existing dam, Phase 1 - Extension of log lifter deck on right bank: match existing rail dimensions;

.2 For new dam: rail section geometry in accordance with wheel base of new log lifter.

.2 End stops: of the types shown on the drawing or an equivalent approved by the Departmental Representative.

.3 Bolts and nuts used for installing rail clips and hook bolts shall comply with ASTM Standards F3125/F3125M and A563 Zinc plated.

.4 Bolts and nuts used for assembling joint bars and stops shall comply with ASTM Standards F3125/F3125M and A563 Zink plated.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Rail joined by bolted standard splice bars and held lateral on steel soleplates using adjustable clips, with chemical anchor and jacking bolts, epoxy grout without shrinkage between soleplates and concrete deck. Use only hot dip galvanized clips, soleplates and anchors designed to support the stoplog lifting machine’s wheel load.

.2 Provide rail expansion joints at the locations of the dam expansion joints.

.3 For the operating working position of the stoplog lifting machine between the dam piers of each sluice, special designed anti-lift clips are required to resist to the uplift forces from the stoplog lifting machine rails anchoring system.

.4 All rail sections ends drilled according to the standard template of the joint bars.

.5 Provide and install electrical grounding on all rail sections.

3.2 INSTALLATION INSPECTION

.1 Rails installation tolerances as shown in the drawings.

END OF SECTION

PART 1 - GENERAL

1.1 DESCRIPTION

.1 This section covers the requirements for the supply of five (5) temporary sets of steel stoplogs to isolate for water flow regulation from the existing dam.

.2 Installation and removal of each steel stoplog section will be carried out at during flow conditions.

.3 Each stoplog is handled by means of two (2) manually operated chain hoists mounted on a mobile gantry crane.

.4 Design, supply, manufacture, transport, unload and test at site of five (5) sets of steel stoplogs. Each set is composed of five (4) HSS sections, approximately 305 mm wide x 305 mm high x 6 629 mm long each, all welded together.

.5 Design, supply, manufacture, transport, unload and install five (5) sets of embedded parts for the steel stoplogs gains, including the concrete anchors and all bolts, tie-rods, washers and nuts necessary for the installation of the embedded parts.

.6 Design, supply, manufacture, transport, unload five (5) sets of stoplog support beams, consisting of two HSS beams along with Polyester sling type 1 – triangle/choker and sling saver web sling shackles.

.7 Validate and or establish the final length of the stoplogs.

1.2 RELATED REQUIREMENT

.1 Section 03 30 00 – CAST-IN PLACE AND PRECAST CONCRETE

.2 Section 05 50 00 – METAL FABRICATIONS

.3 Section 41 22 17 – STOPLOG GANTRY CRANE

1.3 REFERENCES

.1 ASTM International
  .1 ASTM A240/A240M – 19, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
  .2 ASTM A307 - 14e1, Standard Specification for Carbon Steel Bolts and Studs, 60000 PSI Tensile Strength.

.3 ASTM D412 - 16, Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension.
.4 ASTM D570 – 98 (2018), Standard Test Method for Water Absorption of Plastics.
.5 ASTM D638 – 14, Standard Test Method for Tensile Properties of Plastics.
.6 ASTM D695 – 15, Standard Test Method for Compressive Properties of Rigid Plastics.
.7 ASTM D790 – 17, Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
.8 ASTM D792 – 13, Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement.
.9 ASTM D2240 - 15e1, Standard Test Method for Rubber Property-Durometer Hardness.
.10 ASTM E165/E165M – 18, Standard Practice for Liquid Penetrant Testing for General Industry.
.11 ASTM E433 – 71 (2018), Standard Reference Photographs for Liquid Penetrant Inspection.
.12 ASTM E709 - 15, Standard Guide for Magnetic Particle Testing.
.13 ASTM F3125/F3125M - 19, Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions.

.2 CSA International
.1 CSA S16-19, Design of Steel Structures.
.2 CSA G40.20-13/G40.21-13 (R2018), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
.3 CSA W47.1-19, Certification of Companies for Fusion Welding of Steel.
.4 CSA W48-18, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).
.5 CSA W59-18, Welded Steel Construction.
.6 CSA W178.2-18, Certification of welding inspectors.

.3 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-48.9712-2014, Non-destructive testing - Qualification and certification of NDT personnel.

.4 National Building Code of Canada NBCC (2015)

.5 Regulation for Industrial Establishments, O. Reg. 851, as amended by Regulation 528/00

1.4 SUBMITTALS

.1 Design calculations
  .1 Submit for review by the Departmental Representative all design calculations as outlined in this section and calculations which are not outlined in this section but are relevant to the design provided by the Contractor.

.2 Drawings
  .1 The drawings attached to the tender documents are not intended to be "shop" or "working" drawings. Sizes and/or arrangements shown are only intended to illustrate a feasible engineering solution to the requirements of this text. The Contractor is expected to adopt a design meeting the same requirements and be fully responsible for the equipment supplied in every respect.
  .2 Submit for review by the Departmental Representative all construction drawings and all shop and field assembly drawings sealed by a professional engineer licensed to practice in Ontario.
  .3 Show on shop drawings details of all components, bills of materials, heat treatment, sizes of welds and other connections, tolerances, surface finishes and textures of machined areas, surface preparation, coating system and any other relevant information as applicable.
  .4 Show on shop drawings actual fit up sizes and revisions encountered during shop and field assembly.
  .5 On the bills of materials state all identification trade names and model numbers of purchased items.

.3 Submit for review by the Departmental representative, all mill test certificates for the material supplied and for cables used, test certificates with the rupture values.

.4 Welding procedures and welding qualifications
  .1 Submit Welding procedures and welder’s qualifications approved by the "Canadian Welding Bureau". Submit welding procedures with proof that qualification tests have been carried out for each type of joint.

.5 Submit for review by the Departmental Representative all handling, insertion and removal instructions of the steel stoplogs in and from the gains.

.6 Submit for review by the Departmental Representative all handling and erection instructions and procedures for the equipment and material supplied.

.7 Submit for review by the Departmental Representative the proposed detailed procedure to measure and verify the stoplogs leakage referred to in item 2.2.3 of the present section including all necessary material and equipment required to conduct the measurement.

.8 Provide "as-built" drawings and specifications.

.9 Seal and sign all calculations, drawings and Test Procedures by professional engineers licensed to practice in Ontario.

1.5 RESPONSIBILITY

.1 The purpose of these specifications is not to describe in detail the methods of manufacturing and mounting of steel stoplogs. The pertinent drawings attached to this section of the specifications, while attempting to give as fair a representation of the installation as possible, do not claim to define the final detailed design of the stoplogs to be supplied. The Contractor is fully responsible for providing stoplogs that meets the needs of the Owner with regard to performance, reliability and durability and that adapts to the civil engineering design of the structure. However, the design as well as the manufacturing, the assembly and the operating mode must comply with the basic criteria, codes and standards specified in these specifications and these cannot be modified without the acceptance of the Owner’s Representative.

.2 Contractor is responsible in supplying stoplogs that can be lowered and raised in flowing conditions in the embedded gains with manual chain hoists only.

.3 The Owner Representative has determined the dimensions of the water passageways, the type and location of the gates and their method of operation.

.4 Do not modify the dimensions of the slots planned in the primary concrete and all other dimensions for the structures without the Owner Representative’s approval.

.5 Coordinate the design work, manufacturing and installation until the work has received final approval.

1.6 QUALITY CONTROL

.1 The Contractor is responsible for quality control in conformity with the requirements of section 01 45 00 Quality Control.

.2 Develop and submit for review and approval by the Departmental Representative and execute a comprehensive 'Inspection and Test Plan (ITP)' including but not limited the following:
  .1 The fabrication control methods for the stoplogs and the embedded parts showing that the tolerances specified will be met during assembly and after concreting.
  .2 The welds inspection requirements described in items 3.1.2.11 of the present specification.

.3 Engage the service of 3rd party inspectors to perform the appropriate inspection and test plan.

.4 Submit copies of all inspection reports and quality records generated during fabrication.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Pack, load, transport, deliver and unload all material for, to site specified by the Departmental Representative.

.2 Store and ensure safe-keeping of the components delivered.

.3 Provide a packing list for all the items in the shipment for delivery. The list shall identify each part, its description, its dimensions and its weight. The weight shall be accurate within +/- 5%.

.4 Carefully handle and adequately protect all items, so as to avoid damaging their surface finishes and bending them out of shape beyond the manufacturing tolerances specified on the drawings or in these specifications. During manufacture, the Contractor shall take these requirements into account and shall reinforce the parts as needed.

.5 Submit to the Departmental Representative a method for packing and shipping. Do not ship any part to site without prior approval from the Departmental Representative.

.6 Replace or repair any part damaged in transit. Submit to the Departmental Representative for acceptance, a repair method for the damaged part, should the Departmental Representative deem the latter to be

repairable. Should a part need to be replaced, proceed with its replacement including its delivery to site. Pay all costs incurred by this work.

1.8 HYDRAULIC DATA AND GENERAL DIMENSIONS

.1 Stoplogs assembly quantity per sluice bay: 1

.2 Number of sluice bays: 5

.3 1:40 year flood (design level): 241.81 m

.4 Level of the deck: 244.38 m

.5 Level of the temporary stoplog sill: 237.82 m

.6 Clear width of all water passageways: 6.096 m

1.9 LOADING CONDITIONS

.1 General
.1 This item is for the design of the stoplogs and guides.

.2 Maximum allowable stresses
.1 For all normal loading conditions described in these specifications, the permissible stresses shall in no case exceed 90% of those specified in CSA S16-09 and CSA W59-2013.
.2 For all stresses not specified in the above standards and for stresses in concrete use 90% of the values given in the National Building Code.
.3 The bearing pressure transmitted to the concrete by the rear flange of the beam supporting the downstream slide bars of each stoplog section shall not exceed the following value:
.1 If L > L'/4 the maximum bearing pressure is 11.6 MPa
.2 If L < L'/4 the maximum bearing pressure is 7.8 MPa

Where

L = the distance measured in line with the bearing face of the rear flange between the effective end of this flange and the surface in contact with water;

L' = the effective width of rear flange.

Note: The effective width of the flange is the width of the flange over which the stress distribution is uniform and symmetrical with respect to the web of the beam.

.4 The maximum combined stress resulting from the combined action of the skin plate and the beams and stiffeners to which it is welded must not exceed 2/3 of the elastic limit of material under load. However, the bending and shear stresses taken individually shall not exceed 0.54 and 0.36 of the elastic limit of the material used.

.5 In case of jamming of a stoplog, or the follower beam, the maximum induced stress, considering a load equal to two times the nominal total lifting load applied on only one of the lifting points, must not exceed 90% of the elastic limit of the materials under load.

.6 Unless otherwise indicated, calculate permissible stresses in the materials which are not covered by specific standards based on a safety factor of at least 5 with respect to their ultimate strength.

.7 Design the steel stoplogs and the embedded parts such that deformations, warping, elongations and vibrations, under the action of the load to which they are subjected, not result a malfunction, deterioration or a permanent deformation of the loaded components.

.8 All welding shall conform to the requirements of CSA Standard W59-M, using allowable working stresses for dynamically loaded structures at 90% of those specified in this standard.

.3 Design temperatures

.1 Design the equipment to function adequately when subjected to temperature variations between -40°C and +40°C.

.4 Design Loads

.1 Stoplog

.1 Design the stoplogs sections in such way that the stresses in each of their components are less than the maximum permissible stresses defined in these specifications, for the most unfavourable combination of loading conditions described below:

.1 Maximum hydrostatic pressure exerted on the stoplog section corresponding to 1:40 year flood forebay level (EL 241.81 m);

.2 The mass of the stoplog section and its accessories;

.3 All forces acting on the stoplog, when it is moving or stopped, that is during its installation or removal whatever the variations in upstream

and downstream levels are for the range of predictable variations;

.4 All forces resulting of the jamming of the stoplog section in its guides when it is hanging by one lifting point and the lifting force is equal to two times the nominal lifting load;

.5 All possible lifting and friction loads.

.2 In addition to the loading conditions listed above, design the structure of the stoplog section for a lateral load applied at the downstream slide bar periphery equal to 30% of the maximum hydrostatic load.

.3 The deflection of the stoplog sections under the maximum hydrostatic load shall not exceed 1/800 of the distance between the centerline of the bearing shoes.

.2 Stoplogs embedded parts

.1 Design the embedded parts to withstand the most critical stresses exerted by the stoplog sections subject to the loads described in the former paragraph, or by the stoplog sections subjected to the most unfavourable conditions of the following loads:

.1 The mass of stoplog sections;

.2 The hydrostatic load acting on the stoplog sections at the maximum forebay level;

.3 The possible loads and vibrations induced by filling the spaces in a sluice between the upstream and downstream stoplogs and the vertical gate or timber stoplogs;

.4 All forces resulting from the jamming of the stoplog section in its guides;

.5 All the possible lifting and friction loads acting separately or simultaneously with those defined in .1 and .4 above.

.2 Design the embedded parts and the tie-rods to withstand a lateral load equal to 30% of the total hydrostatic load and induced by a lateral slippage of the stoplogs under full hydrostatic head.

.3 Design the embedded parts to withstand the forces induced during concreting by the fluid concrete pressure.

PART 2 - PRODUCT

2.1 MATERIALS

.1 General
  .1 Materials used for the fabrication of all permanent elements shall be new.
  .2 All materials shall conform to the standards specified herein or to similar standards proposed by the Contractor and approved by the Departmental representative. The material of each component shall be specified on the drawings, and the approved standard identified, the number of this standard, the grade or class used, the alloy or pertinent chemical analysis and any special requirements concerning heat treatment and tests.
  .3 The mechanical and chemical characteristics of the materials shall be determined in accordance with the requirements of the chosen standards and in accordance with the special requirements specified in this specification and on the drawings approved by the Departmental representative.
  .4 The materials for the sliding pieces which are in contact shall be selected to prevent any risk of seizing.

.2 Welding materials: Conform to CSA W48 and certified by the Canadian Welding Bureau.

.3 Steel for Stoplogs and embedded parts to be conform to Structural steel to CSA G40.20/G40.21.

.4 Structural Steel sections HSS to be Grade 350W, Class C. Special order to have:
  .1 Maximum twist specification of 7.1 mm over full length of HSS section.
  .2 Straightness specification of 4.76 mm over full length of HSS section.

.5 Stainless steel for embedded parts to conform to ASTM A240/A240M UNS designation S30403.

.6 Steel for tie-rods, washers and nuts for anchors conform to ASTM F3125/F3125M or ASTM A307 specifications.

2.2 STEEL STOPLOGS

.1 General
  .1 Provide five (5) sets of four (4) 305 mm high x 305 mm wide stoplogs. The stoplog assemblies are interchangeable. They can be used, without differentiation, as maintenance stoplogs in any

of the water passageways of the Burleigh Falls dam. The sections will be handled by means of a mobile gantry crane using two (2) manual chain hoists.

.2 Structure

.1 The structure of the stoplogs shall be constructed using welded construction. Each section of the stoplog assembly is composed five (5) of 305 mm x 305 mm x 10 mm hollow square tubes (HSS).

.2 The ends of the tubes shall have openings to allow the HSS sections to be filled with water.

.3 Stoplog seals

.1 The downstream sealing contact vertical surface of each stoplog assembly shall have an Ultra-High Molecular Weight Polyethyline (UHMMWP) plate fixed to the vertical steel plate intended for this purpose or an approved equivalent.

.2 The UHMWPE plate must have a coefficient of dry friction of 0,12 against steel.

.3 Determine the sizes of the seals so that when the stoplogs are installed and the hydrostatic pressure developed by the water head is at its maximum, the rate of leakage is less than 250 L/min.

.4 The UHMWPE plates shall have the following characteristics:

UHMWPE plate		
Characteristic	**Limit**	**ASTM Test Method**
Tensile strength	40 MPa (minimum)	D-638
Tensile modulus of Elasticity	420 MPa	D-638
Flexural Strength	22 MPa	D-790
Flexural Modulus of Elasticity	500 MPA	D-790
Compressive strength	21 MPA	D-695
Compressive Modulus of Elasticity	483 MPa	D-695
Elongation at break	300% (minimum)	D-412
Shore hardness Type D	69 Duro	D-2240
Water absorption, saturation	< 0.010% by weight (maximum)	D-570
Density/specific gravity	0.9 kN/m^3	D-792

.4 Hooking bars

.1 The stop log sections shall be provided with bars for the two lifting hooks or shackles attached to a load chain for the manually operated chain hoists.

2.3 STEEL STOPLOG SUPPORT BEAMS

.1 General
.1 Provide five (5) sets of 2 (2) 76 mm high x 76 mm wide X 520 mm long stoplog support beams. The stoplog support beam assemblies are interchangeable. They can be used, without differentiation, as maintenance stoplogs in any of the water passageways of the existing Burleigh Falls dam. The stoplogs can be hung in their gains by means of the support beams installed above the gain openings.
.2 The stoplog sections will be held in the dogged position by using two (2) or three (3) inch wide polyester sling type 1 – triangle/choker with steel fittings and attached to the stoplog hooking bars with sling saver web sling shackles of the appropriate size.

.2 Structure
.1 The structure of the stoplog support beam shall be constructed using welded construction. Each beam is composed of a 76 mm x 76 mm x 8 mm hollow square tube (HSS).

2.4 STOPLOGS EMBEDDED PARTS

.1 General
.1 Each set of embedded parts shall include the following principal components:
.1 One timber sill beam;
.2 Two steel lined lateral guides;
.2 The fabrication shall take into account the transportation requirements. To this end, Contractor shall reinforce the side guides to prevent deformation of components during handling.

.2 Sill beam
.1 The sill beam shall be of douglas fir timber in one piece, and its top surface shall be smooth and straight to permit the sealing with the bottom lower stop log section.

.3 Lateral guide (Gains)
.1 Provide rigid lateral guides of welded construction, stress relieved and shop machined.

Carry out final assembly of the guides (downstream-upstream-lateral) before machining.

.2 All lateral guide faces for which a tolerance is given in table 1 of the present specification shall be machined.

.3 Select materials for the guide faces that will not seize with the sliding parts of the stoplogs.

.4 Provide stainless steel seal seating plates, machined over their entire length. The top edges of these plates shall be chamfered to permit gradual engagement of the seals during lowering of the stop log.

.4 Heating

.1 The side guides for the stoplogs for water passageways 8 to 12 shall be equipped with tubes to accommodate heating elements. These elements serve to prevent ice forming at all times.

.2 Supply the heating elements on both sides of stop log gains for a total of twenty (20) elements.

.3 The heating elements shall be tubular in shape, with an incoloy sheath of high quality to ensure they can be used immersed or dry. The ends of the sheaths shall be sealed in epoxy within a terminal box that adapts to the sleeves of the heating tube of the guide.

.4 Each side guide shall be equipped with two (2) heating elements 4.0 m long. The elements shall provide heat from level 237.82 m to level 241.82 m.

.5 The required linear heating power is 375 W/m,at 600 V, 1 phase.

.6 The upper ends of the tubes shall have sleeves that adapts to the shape of the terminal box of the heating element.

.7 The sleeves of the tube that are not heated shall be sealed with a threaded cap.

.8 System must have the capacity to switch on and off at each sluiceway individually.

.9 Switches/panels to be located on the deck or at north entrance of the deck. Panel not to interfere with existing log lifter operations and storage.

.10 Power cables to be under the deck and downstream or upstream side. Cables shall be installed in PVC conduit or use jacketed & armoured (e.g. Teck/ACWU) cables.

.11 System to include ground fault detection.

.12 System must not interfere with operation of logs.

.13 Contractor to assume power costs.

.14 Install to code for temporary installations

.15 Obtain ESA approval prior to energizing.

.16 Provide PCA with short training on operation and short operating manual with picture of actual control panel (operation of heater upon request of PCA remains Contractor responsibility)

.17 System shown on drawing is for information purpose only for Contractor to design temporary heating system.

PART 3 - EXECUTION

3.1 FABRICATION

.1 General Requirements

.1 Fabricate all component of your supply in conformity with the fabrication drawings previously approved by the Departmental representative and to CSA standard S16-14 – Design of steel structures and/or to any other applicable standard approved by the Departmental representative.

.2 Welding

.1 Perform welding to Standards CSA W59. Carry out in the shop all welding on load carrying members. In general, only seal welding will be permitted at site. Get prior approval from the Departmental representative of any field welding.

.2 Welding procedures and welders must have been approved and qualified by the "Canadian Welding Bureau" in accordance with the requirements of CSA standard W47.1.

.3 No work shall be undertaken prior to the submittal of the welding procedures and welders qualifications.

.4 Welding electrodes: in conformity to the requirements of CSA W48.

.5 All welding shall be performed in a manner which minimizes the twisting and distortion of the workpiece.

.6 Use low hydrogen electrodes. Reject electrodes having absorbed moisture.

.7 Carefully cut in size the plates to be welded. The dimensions and the shape of the edges to be welded shall be such that they permit proper fusion and full penetration. All welds on exposed parts must be done on both sides and must be continuous and closed.

.8 Do not carry out welding when the temperature of the base metal is below 10°C. In this case, preheat all surfaces within a radius of 75 mm of the point to be welded in accordance with CSA W59 and maintain this temperature throughout the

operation. Peening of welds will not be permitted.

.9 Clean a strip of 50 mm wide on each side of the joint to be welded to eliminate all rust, grease and scale.

.10 Stress relief by heat treatment or vibratory stress relief welded construction parts having machined surfaces before machining to ensure a correct alignment. Include the stress relief procedure in the welding procedure or on the drawings submitted to the Departmental representative for approval.

.11 The following welds inspections are required as a minimum in the ITP:

Type of Weld	**Type of Inspection**	**Extent of Inspection**
Tension flange butt welds	Radiographic	20%
Compression flange butt welds and skin plate acting as a beam flange	Radiographic	5%
Web splice butt welds	Magnetic particle or dye penetrant	10%
Fillet welds	Magnetic particle or dye penetrant	10%
All type of welds	Visual	100%

.1 Remove all unacceptable defects to sound metal.

.2 All weld repairs shall be 100% inspected by the method used originally.

.12 According to above mentioned requirements, if for a given case, radiographic inspection is impossible because of difficulties of access, ultrasonic examinations may be used.

.13 Incomplete penetration or lack of fusion is not accepted. For all statically and dynamically loaded welds, porosity or inclusions must not exceed the limits imposed by the CSA standard W59.

.14 Gouge to sound metal, welding flaws exceeding the specified limits and NDT the gouged sections (magnetic particle or other procedure). Radiograph all repair welds.

.15 Inspection of welds must be performed by qualified inspectors according CSA W178.2 "Qualifications of the welding inspectors" and of the proper level to perform the inspection.

.16 Complementary inspection of welded joints may be carried out using magnetic particle and dye penetration methods in conformity to the requirements of CSA W59 and ASTM E165/E165M.

.17 These methods are only acceptable for detection of flaws on the surface of component or on welds.

.18 Remove striations and irregularities before testing. For dye penetration testing, effectively clean the surface before the application of the penetrant. Only operators and technicians approved and certified by CGSB are permitted to conduct and interpret results.

.3 High Strength Bolts

.1 Indicate on the drawings required bolt tension and/or tightening limits.

.4 Fabrication Tolerances

.1 Set the fabrication tolerances to permit easy installation and adjustment of the embedded parts according to the erection tolerances specified in table 1 at the end of this section, without correction at site. However, they shall not exceed half of the final tolerances after installation in all cases where parts concerned are adjusted at site.

.2 Check machining tolerances based on readings taken at least every 300 mm.

.3 The top and the bottom of the log must be at 90 degrees to the wear plate with square placed tight against wear plate. There must be no more than 1.6 mm gap under the other leg of the square, both top and bottom.

3.2 SHOP ASSEMBLY AND TESTS

.1 Shop assemble and inspect the stoplogs, the embedded parts and the follower beam prior to shipment according to the inspection and test plan referred to in item 1.5 “Quality Control” to demonstrate that all requirements of the specifications and of the approved design and fabrication drawings have been satisfied.

.2 Test for proper operation of the engagement/disengagement of the load chain and shackles with the stoplogs.

.3 All equipment not included in the supply of the stoplogs but necessary for carrying out the tests shall be supplied by the Contractor.

.4 Shipping to the site shall be authorized only once the equipment has undergone all the required tests.

.5 The Departmental representative’s approval to ship does not relieve the Contractor of his responsibilities in regards to final acceptance. Any

malfunction of the equipment following field erection will remain the Contractor's sole responsibility.

3.3 ERECTION AND CONCRETING

.1 Refer to Section 03 30 00 – CAST-IN PLACE AND PRECAST CONCRETE

3.4 FIELD ACCEPTANCE TESTS

.1 General
  .1 Field acceptance tests are required in the presence of the Departmental representative to demonstrate that all contractual guarantees are satisfied and that the equipment is properly installed and adjusted.
  .2 Immediately correct all defects to the satisfaction of the Departmental representative. Repeat the tests until proof that the installation operates in a satisfactory manner.

.2 Final tolerances after installation of stoplogs embedded parts (gains)
  .1 Tolerances specified in “Table 1” must be met after the final installation of the embedded parts and stoplogs.
  .2 Surfaces for which the specified tolerances are less than 1 mm shall be checked based on readings taken at least every 300 mm. For other surfaces for which the tolerance was specified, tolerances shall be checked based on readings taken at least every 600 mm.
  .3 At the joint between different sections of the embedded parts, the guide and watertight surfaces shall be smooth.

.3 Dry Tests for the stoplogs and Embedded Parts:
  .1 Following installation of the embedded parts and prior to cofferdams removal, carry out operational tests in the dry on the chosen sluice (water passage). These tests include the following operations:
    .1 Using the Gantry crane hoist system, take one stoplog section selected by the Departmental Representative and brings it over the embedded parts of the water passage;
    .2 Lower the stoplog section down to the sill with stopping at successive intervals;

.4 Immersion tests:
  .1 Immersion tests will be conduct by the Contractor and witnessed by the Departmental representative.

.2 These tests in water will simulate the main operating conditions that may happen during normal and emergency operation. These tests shall demonstrate that the stoplogs operations are satisfactory and without excessive vibrations.

.3 The leakage will be measured and compared against the permissible values stipulated in these specifications.

.5 Refer to section 01 91 13 – General Commissioning (CX)for testing the existing upper timber stop log operation using the existing log lifter.

.6 After completion of these tests to the satisfaction of the Departmental representative an acceptance certificate will be issued to the Contractor.

TABLE 1

FINAL TOLERANCES AFTER INSTALLATION OF THE STOPLOG EMBEDDED PARTS

EMBEDDED PARTS	**POSITION OR DIMENSION (mm)**	**VERTICALITY T (mm/height)**	**HORIZONTALITY T (mm/length)**	**STRAIGHTNESS T (mm/m)**
Sill beams sealing surfaces	±2,0 (*)		2,0(**)	1,0/2,0
Lateral guides sealing surfaces	± 2,0(*)	2,0		1,0/2,0

(*) The position tolerances are established with respect to the axes of the opening and shall be respected throughout the entire length of the embedded parts.

(**) This tolerance applies to the longitudinal and transversal directions.

END OF SECTION

PART 1 - GENERAL

1.1 DESCRIPTION

.1 This section covers the requirements for the supply of new timber stoplogs, the salvage of the existing dam timber stoplogs and embedded parts for twelve (12) sluices for water control regulation.

.2 Fabricate, supply and transport, unload and test at site twelve (12) sets of ten (10) non-treated "Douglas Fir, Select Structural timber" stoplogs, 355 mm wide x 305 mm high x 6620 mm long each, spruce machined on the four longitudinal sides.

.3 Design, supply, manufacture, transport, unload and install twelve (12) sets of embedded parts for the timber stoplog and maintenance stoplog gains, including the concrete anchors and all bolts, tie-rods, washers and nuts necessary for the installation of the embedded parts.

.4 Validate and or establish the final length of the timber stoplogs.

1.2 RELATED REQUIREMENTS

.1 Section 03 30 00 – CAST-IN-PLACE AND PRECAST CONCRETE

.2 Section 05 50 00 – METAL FABRICATIONS

.3 Section 09 97 01 – PAINTING STEEL SURFACES

1.3 REFERENCES

.1 ASTM International
  .1 ASTM A653/A653M - 19a, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
  .2 ASTM E125 – 63 (2018), Standard Reference Photographs for Magnetic Particle Indications on Ferrous Castings.
  .3 ASTM E165/E165M – 18, Standard Practice for Liquid Penetrant Testing for General Industry.
  .4 ASTM E433 – 71 (2018), Standard Reference Photographs for Liquid Penetrant Inspection.
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150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions.

.2 America Society of Mechanical Engineers (ASME)
.1 ASME B1.1-2003(2018), Unified Inch Screw Threads (UN and UNR Thread Form).

.3 CSA International
.1 CSA S16-19, Design of Steel Structures.
.2 CSA G40.20-13/G40.21-13 (R2018), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
.3 CSA B111-74 (R2003), Wire Nails, Spikes and Staples.
.4 CSA O86-19, Engineering Design in Wood.
.5 CSA O80 Series-15 (2019), Wood Preservation.
.6 CSA W47.1-19, Certification of Companies for Fusion Welding of Steel.
.7 CSA W48-18, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).
.8 CSA W59-18, Welded Steel Construction.
.9 CSA W178.2-18, Certification of welding inspectors.
.10 CSA Z809-08, Sustainable Forest Management.

.4 Forest Stewardship Council (FSC)
.1 FSC-STD-01-001(V5-2)-2015, FSC Principle and Criteria for Forest Stewardship.
.2 FSC-STD-20-002(V3-0)-2009, Structure and Content of Forest Stewardship Standards.
.3 FSC Accredited Certified Bodies

.5 National Lumber Grades Authority (NGLA)
.1 Standard Grading Rules for Canadian Lumber (2017).

1.4 SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – SUBMITTAL PROCEDURES.

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for wood timbers and include product characteristics, performance criteria, physical size, finish and limitations.
.2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 43 - Environmental Procedures and 01 35 29.06 - Health and Safety Requirements

.3 Drawings

.1 The drawings attached to the tender documents are not intended to be "shop" or "working" drawings.
.2 Submit for review all shop drawings and all field assembly and construction drawings, signed and sealed by a professional engineer licensed to practice in the province of Ontario.
.3 Show on shop drawings details of all components, bills of materials, heat treatment, sizes of welds and other connections, tolerances, surface finishes and textures of machined areas, surface preparation, coating system and any other relevant information as applicable.
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.5 Welding procedures and welding qualifications:
.1 Submit Welding procedures and welder's qualifications approved by the "Canadian Welding Bureau". Submit welding procedures with proof that qualification tests have been carried out for each type of joint.

.6 Submit for review by the Departmental Representative all handling and erection instructions and procedures of the equipment and material supplied.

.7 Submit for review by the Departmental Representative the proposed detailed procedure to measure and verify stoplogs leakage referred to in item 2.3.2 of the present section including all necessary material and equipment required to conduct the measurement.

.8 Provide "as-built" drawings and specifications.

.9 Seal and sign all drawings and Test Procedures by professional engineers licensed to practice in the province of Ontario.

.10 Samples:
.1 Prepare sample of typical stoplog machined end and U bolt installation for approval of Departmental Representative.

1.5 RESPONSIBILITY

.1 The purpose of these specifications is not to describe in detail the methods of manufacturing and mounting of timber stoplogs. The pertinent drawings attached to

this section of the specifications, while attempting to give as fair a representation of the installation as possible, do not claim to define the final detailed design of the stoplogs to be supplied. The Contractor is fully responsible for providing stoplogs that meets the needs of the Owner with regard to performance, reliability and durability and that adapts to the civil engineering design of the structure. However, the design as well as the manufacturing, the assembly and the operating mode must comply with the basic criteria, codes and standards specified in these specifications and these cannot be modified without the acceptance of the Owner's Representative.

.2 Contractor is responsible in supplying stoplogs that can be lowered and raised in flowing conditions in the embedded gains with a hydraulic stoplog lifter.

.3 The Owner Representative has determined the dimensions of the water passageways, the type and location of the gates and their method of operation.

.4 Do not modify the dimensions of the slots planned in the primary concrete and all other dimensions for the structures without the Owner Representative's approval.

.5 Coordinate the design work, manufacturing and installation until the work has received final approval.

1.6 QUALITY CONTROL

.1 The Contractor is responsible for quality control in conformity to the requirements of section 01 45 00 – QUALITY ASSURANCE AND QUALITY CONTROL.

.2 Develop and submit for review and approval by the Departmental Representative and execute a comprehensive 'Inspection and Test Plan (ITP)' including but not limited the following:

.1 The fabrication control methods of the stoplogs and the embedded parts showing that the tolerances specified will be met during assembly and after concreting.

.2 The welds inspection requirements described in items 3.1.2.11 of the present specification.

.3 Engage the service of third-party inspectors to perform the appropriate inspection and test plan.

.4 Submit copies of all inspection reports and quality records generated during fabrication.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions and 01 61 00 - Common Product Requirements.

.2 Store the logs prior to their installation in a humid environment having at least 50% relative humidity.

.3 Submit the storage methods to the Departmental representative during fabrication and after delivery on site.

.4 Ensure that the logs will not be submitted to a premature drying condition, as in a heated space or under the sun for example, which could cause cracking or shrinking of the logs. In case this storage precaution is not followed causing logs deterioration, replace the logs.

.5 Pack, load, transport, deliver and unload all material required for installation, to site specified by the Departmental Representative.

.6 Provide a packing list for all the items in the shipment for delivery. The list shall identify each part, its description, its dimensions and its weight. The weight shall be accurate within +/- 5%.

.7 Carefully handle and adequately protect all items, so as to avoid damaging their surface finishes and bending them out of shape beyond the manufacturing tolerances specified on the drawings or in these specifications. During manufacture, take these requirements into account and reinforce parts as needed.

.8 Submit to the Departmental Representative a method for packing and shipping. Do not ship any part to site without prior approval from the Departmental Representative.

.9 Replace or repair any part damaged in transit. Submit to the Departmental Representative for acceptance, a repair method for the damaged part, should the Departmental Representative deem the latter to be repairable. Should a part need to be replaced, proceed with its replacement including its delivery to site. Pay all costs incurred by this work.

1.8 HYDRAULIC DATA AND GENERAL DIMENSIONS

.1 Single Stoplogs quantity per sluice bay: 10

.2	Number of sluice bays:	12
.3	Average navigation water level:	241.47 m
.4	Minimum winter water level:	241.00 m
.5	Normal average water level:	237.41 m
.6	Level of the deck:	243.03 m
.7	Stoplog sill beam elevation:	238.42 m
.8	Clear width of all water passageways:	6.096 m

1.9 LOADING CONDITIONS

.1 Maximum allowable stresses
- .1 Calculate the permissible stresses as indicated in Engineering Design in Wood CAN/CSA-086-14.
- .2 Design the stoplogs and their embedded parts such that the deformations, deflections, elongations, oscillations and vibrations, under the action of the loads to which they are submitted, do not result in a malfunction, deterioration or a permanent deformation of the loaded components or assemblies.
- .3 All welding shall conform to the requirements of CSA Standard W59-M. From the point of view of stresses, 90% of the values of the stresses specified in this standard are permitted.

.2 Design temperatures
- .1 Design the equipment to function adequately when subjected to temperature variations between -40°C and +40°C.

1.10 LOADING CASES

.1 Stoplog
- .1 Design the logs in such way that the stresses in each are less than the maximum permissible stresses for the most unfavorable combination of loading conditions described below:
  - .1 Maximum hydrostatic pressure exerted on the stoplog section corresponding to maximum normal operating forebay level (EL 241.47 m);
  - .2 The mass of the stoplog and its accessories.
  - .3 All forces resulting of the jamming of the stoplog in its guides when it is hanging by one lifting point and the lifting force is equal to two times the nominal lifting load.
  - .4 All possible lifting and friction loads.

.2 Stoplogs embedded parts

.1 Design the embedded parts to withstand the most critical stresses exerted by the stoplog sections subject to the loads described in the former paragraph, or by the stoplog sections subjected to the most unfavourable conditions of the following loads:

.1 The mass of stoplog sections;

.2 The hydrostatic load acting on the stoplog sections at the maximum forebay level;

.3 All forces resulting from the jamming of the stoplog section in its guides;

.4 All the possible lifting and friction loads acting separately or simultaneously.

.2 Design the embedded parts and the tie-rods to withstand a lateral load equal to 30% of the total hydrostatic load and induced by a lateral slippage of the stoplogs under full hydrostatic head combined with the load due to the infiltration of water defined below.

.3 Design the embedded parts to withstand the forces induced during concreting by the fluid concrete pressure.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Use new materials for the fabrication of all permanent elements.

.2 All materials to be conform to the standards specified herein or to similar standards proposed by the Contractor and approved by the Departmental representative.

.3 Determine the mechanical and chemical characteristics of the materials in accordance with the requirements of the chosen standards and in accordance with the special requirements specified in this specification and on the drawings reviewed by the Departmental representative.

.4 Select the materials for the sliding pieces that are in contact to prevent any risk of seizing.

.5 Welding materials: Conform to CSA W48 and certified by the Canadian Welding Bureau.

.6 Steel for embedded parts to be conform to Structural steel to CSA G40.20/G40.21.

2.2 STOPLOGS

.1 Stop logs Timber: Select Structural grade Douglas Fir, rough lumber, full sawn, with lifting "U" bolts. Sizes and Installation as indicated. Stop logs ARE NOT to be treated, with the exception of yellow paint. Timber grading to be in accordance with:
  .1 Close Grain Select Structural in accordance with National Lumber Grading Association (NLGA), Standard Grading Rules for Canadian Lumber, Section 5, paragraph 130 and 130a, all to rough lumber, full sawn, and paragraph 711, rough with no wane.
  .2 All lumber will have tight grain with no less than 8 growth rings per inch of thickness.
  .3 Rough sawn, dimensions as specified;
  .4 All lumber supplied is to be stamped showing the grade, species and grading agency, authorized by the Canadian Lumber Standards Administration Board;
  .5 Mill certificate of grade must accompany each shipment;
  .6 Ends of logs painted yellow to prevent checking;
  .7 The top of the log is to be painted 300 mm on each end as well as 900 mm in the center of the log.

.2 Installation and removal of each stoplog section will be carried by means of a hydraulic log lifter.

.3 Fit each timber log end with galvanised U-Bolt pick up at each end as point of lifting for the hydraulic log lifter hook.

.4 Locate the lifting points on the longitudinal centreline of the log and equally spaced from the center.

2.3 WATERTIGHTNESS

.1 Smooth the four longitudinal sides of each log by a planer machine to assure good water tightness.

.2 Establish the surface finish of the stop logs to restrict water leakage per opening to 3 litres/min./meter length of sealing surface maximum.

2.4 STOPLOGS EMBEDDED PARTS

.1 General
  .1 Each set of embedded parts shall include the following principal components:
    .1 One sill beam;
    .2 Two steel lined lateral guides;

.2 Take into account the transportation requirements. To this end, reinforce the side guides to prevent deformation of their components during handling.

.3 The general arrangement of all embedded parts shall be such, as to facilitate placement of sealing concrete and to eliminate the formation of voids.

.2 Sill beam

.1 The sill beam shall be of steel in one piece, and its top surface shall be smooth and straight to permit the sealing with the bottom lower stop log section. The surface shall be in stainless steel and machined over its full length.

.2 Design the embedded parts of the sill beam taking into account the arrangement of the anchors installed in the primary concrete

.3 Lateral guides (Gains)

.1 Provide rigid lateral guides of welded construction, stress relieved and shop machined. Carry out final assembly of the guides before machining.

.2 All lateral guide faces for which a tolerance is given in Table 1 of the present specification shall be machined.

.3 The top edges of these plates shall be chamfered to permit gradual engagement of the seals during lowering of the stop log.

.4 Embedded parts of lateral guides shall be installed directly in primary concrete.

.5 The lateral gains must be extended beyond the primary concrete up to the level of the concrete deck slabs. Appropriate stiffeners must be designed for the extended section of the lateral guide which will not be concreted.

.4 Jacking bars for lateral gains

.1 Incorporate jacking bars into the design of the lateral gains as shown on the drawings. These bars must be dimensioned and spaced as shown and will be used to jack the stoplogs towards the sill to improve sealing.

PART 3 - EXECUTION

3.1 FABRICATION

.1 General Requirements

.1 Fabricate all components in conformity with shop drawings previously reviewed by the Departmental representative and to CSA S16 and/or to any

other applicable standard approved by the Departmental Representative.

.2 Welding

.1 Perform welding to CSA W59. Carry out in the shop all welding on load carrying members. Only seal welding will be permitted at site.

.2 Welding procedures and welders must have been approved and qualified by the "Canadian Welding Bureau" in accordance with the requirements of CSA W47.1.

.3 Submit welding procedures with proof that qualification tests have been carried out for each type of joint.

.4 Welding electrodes: in conformity to the requirements of CSA W48.

.5 All welding shall be performed in a manner which minimizes the twisting and distortion of the workpiece.

.6 Use low hydrogen electrodes. Reject electrodes that have absorbed moisture.

.7 Carefully cut in size the plates to be welded. The dimensions and the shape of the edges to be welded shall be such that they permit proper fusion and full penetration. All welds on exposed parts must be done on both sides and must be continuous and closed.

.8 Do not carry out welding when the temperature of the base metal is below 10°C. In this case, preheat all surfaces within a radius of 75 mm of the point to be welded in accordance with CSA W59 and maintain this temperature throughout the operation. Peening of welds will not be permitted.

.9 Clean a strip of 50 mm wide on each side of the joint to be welded to eliminate all rust, grease and scale.

.10 Stress relief by heat treatment or vibratory stress relief welded construction number parts having machined surfaces before machining to ensure a correct alignment. Include the stress relief procedure in the welding procedure or on the drawings submitted to the Departmental representative for review.

.11 The following welds inspections are required as a minimum in the ITP:

Type of Weld	Type of Inspection	Extent of Inspection
Butt welds	Magnetic particle or dye penetrant	10%
Fillet welds	Magnetic particle or dye penetrant	10%
All type of welds	Visual	100%

.1 Remove all unacceptable defects to sound metal.
.2 All weld repairs shall be 100% inspected by the method used originally.

.12 Incomplete penetration or lack of fusion is not accepted. For all statically and dynamically loaded welds, porosity or inclusions must not exceed the limits imposed by the CSA W59.

.13 Gouge to sound metal, welding flaws exceeding the specified limits. Non-destructive testing or NDT (magnetic particle or other procedure): gouged and repaired sections after.

.14 Inspection of welds must be performed by qualified inspectors according CSA W178.2 and of the proper level to perform the inspection.

.15 Complementary inspection of welded joints may be carried out using magnetic particle and dye penetration methods in conformity with the requirements of CSA W59 and ASTM E165/E165M.

.16 These methods are only acceptable for detection of flaws on the surface of component or on welds.

.17 Remove striations and irregularities before testing. For dye penetration testing, effectively clean the surface before the application of the penetrant. Only operators and technicians approved and certified by CGSB are permitted to conduct and interpret results.

.3 High Strength Bolts

.1 Indicate on the drawings required bolt tension and/or tightening limits. Nuts, bolts and dowels shall conform to Canadian dimensional standards and the threads shall conform to the require-ments of ASME B1.1.

.4 Fabrication Tolerances

.1 Set the fabrication tolerances to permit easy installation and adjustment of the parts according to the erection tolerances specified in Table 1 at the end of this section, without correction at site. However, they shall not exceed half of the final tolerances after installation in all cases where parts concerned are adjusted at site.

.2 Check machining tolerances based on readings taken at least every 300 mm.

3.2 PAINTING AND GALVANISING

.1 Refer to 09 97 01 – PAINTING STEEL SURFACES.

.2 Embedded parts to be galvanized.

3.3 SHOP ASSEMBLY AND TESTS

.1 Shop assemble and inspect the timber logs and the embedded parts prior to shipment according to the inspection and test plan referred to in item 1.5 “Quality Control” to demonstrate that all requirements of the specifications and of the approved design and fabrication drawings have been satisfied.

.2 Shipping to the site shall be authorized only when the equipment has undergone and passed all the required verifications.

.3 Final acceptance shall be affected on the site during acceptance tests. Any malfunction of the equipment following field erection will remain the Contractor's sole responsibility. Carry out any necessary repairs or adjustments after having received the Departmental representative’s approval to do so.

3.4 ERECTION AND CONCRETING OF EMBEDDED PARTS

.1 Refer to section 03 30 00 – CAST-IN-PLACE AND PRECAST CONCRETE.

3.5 TIMBER STOP LOGS INSPECTION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for wood timber installation in accordance with contract documents.
  .1 Visually inspect substrate in presence of Departmental Representative.
  .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.6 FIELD ACCEPTANCE TESTS

.1 General
  .1 Field acceptance tests are required in the presence of the Departmental representative to demonstrate that all contractual guarantees are satisfied and that the equipment is properly installed and adjusted.
  .2 Correct to the satisfaction of the Departmental representative any defect. Repeat the tests

until proof that the installation operates in a satisfactory manner.

.2 Dry Tests for the stoplogs and Embedded Parts:

.1 Following installation of the embedded parts and prior to cofferdams removal, carry out operational tests in the dry on the sluice (water passage) to be equipped with stoplogs. These tests include the following operations, using the hydraulic log lifter system:

.1 Take one timber stoplog and lower it until the sill with stopping at intervals in the sluice.

.2 Check the behaviour of each log during the maneuver.

.3 Fill the sluiceway with logs from operating deck.

.4 Remove all logs from one sluice and place them on operating deck using roller rail system.

.5 Contractor shall be responsible for rectifying all damage done to hydraulic log lifter system as a result of this testing.

.3 Immersion tests:

.1 Perform immersion test in presence of Departmental Representative

.2 These tests in water will simulate the main operating conditions that may happen during normal and emergency operation. These tests shall demonstrate that the equipment is operating normally and without excessive vibrations.

.3 Measure the leakage and compare it against the permissible values stipulated in item 2.3 of these specifications.

.4 After completion of these tests to his satisfaction, the Departmental representative will issue an acceptance certificate to the Contractor.

TABLE 1
FINAL TOLERANCES FOR INSTALLATION OF EMBEDDED PARTS

EMBEDDED PARTS	POSITION OR DIMENSION (mm)	VERTICALITY T (mm/height)	HORIZONTALITY T (mm/length)	STRAIGHTNESS T (mm/m)
Sill beams sealing surfaces	±2,0 (*)		1,5(**)	1,0/2,0
Lateral guides sealing surfaces	± 2,0(*)	2,0		1,0/2,0

(*) The position tolerances are established with respect to the axes of the opening and shall be respected throughout the entire length of the embedded parts.

(**) This tolerance applies to the longitudinal and transversal directions.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 02 41 16 – STRUCTURE DEMOLITION

.2 Section 31 23 33.01 – EXCAVATION, TRENCHING AND BACKFILLING

1.2 DESCRIPTION

.1 This Section specifies requirements for dewatering work as shown on the Drawings and specified herein.

.2 These temporary measures shall be designed to accommodate:

.1 Seasonal navigation of the waterway and adjoining lock
.2 Navigation operating levels
.3 Seasonal flows and winter conditions

.3 The work includes, but is not limited to:
.1 Engaging a professional engineer licensed in the province of Ontario to design and oversee the implementation of the following, but not limited to:
.1 cofferdams, dewatering, environmental control, seepage control and all temporary in water works including accesses and lower log operation systems.
1. Cofferdams which include all types of temporary water retaining structures
.2 Produce a risk management plan for all dewatering, cofferdams and temporary in-water-works.
.3 Monitor performance of cofferdams including performance of existing dam.
.4 The design, supply, construction, maintenance and removal of dewatering structures.
.5 Design, supply, installation, operation, maintenance and removal of dewatering systems.
.6 Design and Operation of existing dam lower logs.
.7 Coordination with parks Canada for sluice operations
.8 Design, installation, maintenance and removal of environmental measures for dewatering systems

.9 Staging of dewatering in individual dewatering zones, if required for executing work.
.10 Operation and continuous monitoring of dewatering structures and systems to keep them operational and safe for duration of work.
.11 Methodology for removal of temporary works and for maintaining stability of new and existing Works during the recharging (filling) of the waterway;
.12 Any other works required for the control of lake levels, dewatering of the work area, its access, and demolition of existing structures.

.2 Implementation of cofferdams, in-water accesses, in water works dewatering and diversion works according to the Professional Engineer's design and to the in-water work restrictions indicated in Section 01 11 00 - GENERAL INSTRUCTIONS.
.3 Constructing and maintaining dewatering and diversion structures for the duration of the Work.
.4 Providing and maintaining all dewatering equipment for the duration of the Work.
.5 Removing water from Work spaces and maintaining these spaces in the dry state for the duration of the Work.
.6 Supply of standby equipment, ready to immediately switch into service, to replace dewatering equipment which malfunctions or requires maintenance.
.7 Completely Removing temporary cofferdams, accesses, dewatering and diversion structures at the end of the Work, according to the in-water work restrictions.
.8 Complying with the approved SSEMP, provisions of Section 01 35 43 - Environmental Procedures, and Section 01 35 46- Archaeological and Cultural Procedures.

1.3 MESURAMENTS AND PAYMENT PROCEDURES

.1 Payments related to this Section shall be as set out in Section 01 22 01 – Measurement and Payment.

1.4 REFERENCES

.1 Canadian Dam Association
.1 Dam Safety Guidelines 2007 (revised 2013)

.2 Ontario Provincial Specifications Standards (OPSS)

.1 OPSS.MUNI 518, April 2017– Construction Specification for Control of Water from Dewatering Operations.
.2 OPSS.MUNI 805, November 2018 – Construction Specification for Temporary Erosion and Sediment Control Measures.
.3 OPSS.PROV 902, November 2010 – Construction Specification for Excavating and Backfilling – Structures.

.3 Lakes and Rivers Improvement Act, R.S.O. 1990, c. L.3. Ontatio, December 2019

.4 US Army Corps of Engineers (USACE):
.1 EM-1110-2-2300 - General Design and Construction Considerations for Earth and Rock-Fill Dams.
.2 EM-1110-2-2502 – Retaining and Flood Walls.
.3 US Army Corps of Engineers (USACE), EM-1110-2-2503 - Design of Sheet Pile Cellular Structures Cofferdams and Retaining Structures.
.4 US Army Corps of Engineers (USACE), EM-1110-2-1902 – Slope Stability.

1.5 REGULATORY REQUIREMENTS AND PERMITTING

.1 Adhere to local, Provincial and Federal requirements relating to:
.1 Protection of environment.
.2 Safety of construction.
.3 Protection of workers.

.2 The Parks Canada Agency is responsible for attaining the Department of Fisheries and Oceans Authorization.

.3 The design, details for the construction and installation and removal of cofferdams and temporary water control structures must be in accordance with Fisheries Act.

.4 Engage services of Professional Engineer licensed in Ontario, Canada to design, plan and certify cofferdams, dewatering systems and all temporary in-water works.

.5 The Contractor is responsible to obtain all required permits and approvals necessary to construct, operate and demolish cofferdams and pay all cost associated with permitting

.6 Submit Permit to Take Water (PTTW) application to Ministry of Environment of Ontario (MEO) along with drawings pertinent to dewatering and water diversion calculations.

.7 Dewatering Plan to be reviewed and accepted by Departmental Representative and PCA Environmental Authority. Refer to Section 01 35 43 - ENVIRONMENTAL PROCEDURES.

.8 Carry out dewatering work in accordance with Section 01 35 43 - ENVIRONMENTAL PROCEDURES.

1.6 SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – SUBMITTAL PROCEDURES.

.2 Submit, prior to initiation of construction, an Emergency Preparedness Plan (EPP) specifying measures to be taken in the event of an exceptionally large flood occurring during construction and commissioning work, in order to enhance health and safety protection for all individuals during construction work and commissioning, and to protect persons and property along the watercourse.

.3 Submit Dewatering and Wastewater Management Plan including risk analysis and emergency procedures a minimum.
- .1 Initial plan including high level dewatering strategy within 10 days of Contract award
- .2 Detailed plans per phase including all details 4 weeks prior to commencement of work.

.4 The Dewatering and Wastewater Management Plan should be developed as part of the site specific EMP, based on calculations supporting the required specifications, for each stage of construction, which includes, without being limited to:
- .1 Design and layout of dewatering structures, including cofferdams, sheet piles and structures requirements, calculation details (stability study for cofferdams and structural capacity for sheet piles and supporting structures), materials and method of placement for water tightness.
- .2 Design and layout of dewatering system, including expected seepage and pumping system required for managing infiltrations during and after initial dewatering.
- .3 Design and layout of environmental features and mitigation measures that form part of the dewatering system.
- .4 Staging of dewatering.
- .5 Schedule of installation and staging of dewatering structures and dewatering systems.
- .6 Installation and removal procedures including diving and crane details.

.7 Back-up plan and emergency procedures during operation.
.8 Monitoring procedures during operation.
.9 Shop drawing of lower log operation system
.10 Contingency plan to open or close existing sluices (8 to 12) in case of failure to operate the lower 4 logs.
.11 Shop drawings of temporary gain heater
.12 Shop drawings of all cofferdams, flow diversions, dewatering systems and all in water temporary -works including accesses.
.1 Shop drawings to sealed by professional engineer in the province of Ontario
.2 Shop drawings to include design criteria
.13 Dewatering Plan as well as related submittals to bear stamp and signature of Professional Engineer licensed in Ontario, Canada.
.14 Submit the design, materials specifications and sequencing for the cofferdams to the Departmental Representative four (4) weeks before the commencement of cofferdam construction.
.15 Submit design of floating silt curtain, as specified in Section 35 49 25 - TURBIDITY CURTAIN.
.16 Submit method for removal of fine material from the water during dewatering (settling pond or filtration) four (4) weeks prior to the removal of water.
.17 Submit design criteria and calculations of (for each stage of construction):
.1 Stability of cofferdams and existing structures and slopes during dewatering and of the new structure during surcharging;
.2 Flow diverters and related structures; Provide methodology, details (including sequencing) and shop drawings for the removal of cofferdams, shoring, bracing and underpinning, and for site restorations at areas disturbed by the removal of these temporary works including areas of Surface Protection as set out on the Contract drawings.
.3 Measures to control seepage, and surface drainage into the Work area, to maintain existing slope and new embankment stability during the Work, and to keep the Work area in a dry state
.18 Provide risk analyses for Dewatering and Diversion Works, seepage control and embankment stability based on the design criteria:
.1 During the installation of the temporary works;
.2 During the progress of the Work;
.3 During the removal until final acceptance.

.19 Provide methodology, details (including sequencing) and shop drawings for the removal of cofferdams, shoring, bracing and underpinning, and for site restoration at areas disturbed by the removal of these temporary works.

.5 Submit detail drawings to Regulatory Agencies, as required to satisfy conditions for granting of permits.
.1 Modify detail drawings to meet Regulatory Agency Requirements.
.2 Revise details to address site conditions encountered during construction.

1.7 SCOPE OF WORK

.1 The work described in this section includes but is not limited to the following:
.1 Phase 1 Upstream Bulkhead and downstream cofferdams
.2 Use of existing dam as upstream cofferdam
.3 Stage 2 Downstream Cofferdam and sealing cofferdam between new and old structure
.4 Stage 3 Downstream Cofferdam, sealing cofferdam between new and old structure and access jetty (or other access method/structure)
.5 Construction, maintenance and demolition of the cofferdams
.6 Dewatering systems
.7 In-water accesses to dewatered area
.8 Lower log operation system
.9 Temporary gain heaters

1.8 TEMPORARY WORKS AND ENGINEERING SERVICES

.1 Contractor is fully responsible for the design and installation of the cofferdams. Cellular cofferdam, structural steel with drilled/embedded post or any other design to be approved by the Departmental Representative.

.2 Designer of cofferdam, flow diversion and other related dewatering structures, including seepage control and treatment, and stability of excavated embankment including protection of existing Works, must be a Professional Engineer, licensed to practice in the Province of Ontario, with considerable expertise and experience in design of similar structures and systems, and be acceptable to the Departmental Representative.

.3 Designer must: make, check and sign all calculations; check, seal and sign all drawings and related reports; weekly inspection of dewatering and diversion

structures and systems on site during construction; verify their adequacy and safety; provide a written notice to the Departmental Representative stating that the temporary works have been constructed as per design requirements and that they are ready for safe operation.

.4 Assist/participate in the surveillance and monitoring of the lock structures, adjacent abutments, slopes and surrounds in accordance with Section 01 48 00 – Construction Control and Monitoring..
  .1 Should there be evolution in the state of cofferdams the designer shall adjust frequency of inspection and take action accordingly

.5 The cofferdam design engineer shall be on site to witness all of the following activities applicable to the project and provide individual signed and sealed letters confirming that they were completed with accordance to the design drawings:
  .1 Anchor installation
  .2 Post installation
  .3 Steel/sheetpile installation
  .4 Backfill/rock fill installation
  .5 Membrane installation
  .6 Sealing of cofferdam bottom
  .7 Sealing of cofferdam sides
  .8 Adequacy of cofferdam stability

.6 No dewatering or demolition work shall commence until all necessary signed and sealed letters in order to certify the cofferdam have been submitted by the Contractors cofferdam design engineer

.7 Any bedrock or riverbed sealing requirements for the cofferdams is the responsibility of the Contractor and must first employ non-cementitious products as a first option, including membranes and sandbags. In the event these approaches are unsuccessful, additional means including grouting and tremie concrete use may be explored however their use is subject to approval of the Departmental Representative.

1.9 DESIGN CRITERIA

.1 Design dewatering systems and staging of dewatering to ensure maintenance of work spaces in dry state for duration of work.
  .1 The Contract drawing are a schematic representation of dewatering system and environmental controls.
  .2 The Contract drawings show the maximum extent of cofferdam and dewatered area footprint.
  .3 All cofferdams parallel to the flow, or within a flow or backflow area, must be steel cofferdams

and extend a minimum of 7 m beyond any granular cofferdam

.4 Cofferdams must withstand prolonged overtopping should the site require to be flooded during a severe flood event.

.5 the drawings show minimum crest elevations

.1 If the Contractor believes the proposed minimum cofferdam crest elevations are not adequate, they shall budget at the time of the tender any necessary modifications to raising and strengthening the cofferdams. No claims will be considered at the time of construction for inadequacy of cofferdams to maintain the work area dry.

.2 Plan and design dewatering structures and dewatering systems considering:

.1 Access to cofferdams and access to reach any portion of Work.

.2 Space required for ingress-egress, multiple parallel work teams, scaffolding, equipment and crews to work in dewatered areas.

.3 Sequence of work and staging of work and dewatering to accelerate work.

.4 Water levels which rise and fall due to rainfall, snowfall, snow melt and spring freshet.

.5 The foundation level for the Works.

.6 Hydraulic pressure on structures.

.1 This include static and dynamic load

.2 Ice loads

.3 Dynamic Forces on structures at an angle to the main flow

.7 Seepage of water through dewatering structures and substrate such as bedrock, and riverbed.

.8 Winter conditions such as; build-up of ice and snow; freezing temperatures, freeze-thaw cycles and ice sheets.

.9 Environmental regulations and requirements.

.10 Parks Canada Agency operators and general public and boating public safety

.11 Presence of MTO bridge and cofferdams constraining flows.

.3 Design cofferdams to comply with regulations of the *Canadian Dam Association's Dam Safety Guidelines* (2013) and the province of Ontario's *Lakes and Rivers Improvements Act* (2019) and USACE guidelines.

.4 At all times, maintain environmental quality of water to Section 01 35 43 - Environmental Procedures. Maintain permits and approval stipulation as set out in Section 01 41 00 - Regulatory Requirements.

.5 Cofferdam to incorporate a watertight membrane or other means to assure water tightness and stability.

.6 Ensure that no phase of Work threatens safe performance of cofferdam.

.7 Water which enters dewatered work areas during construction to be separated between blue water and brown water as per Section 01 35 43 - ARCHEOLOGICAL, CULTURAL, ENVIRONMENTAL PROCEDURES.
- .1 Brown water to be treated through filter, sediment trap, settling pond, anionic flocculation or by physical means such as a filter press, prior to being discharged downstream.
  - .1 Do not discharge water upstream.
  - .2 Do not allow discharge of water to cause erosion or disturb cofferdams.
  - .3 Separate offsite runoff and infiltrating water from construction activities and sediment sources.
- .2 Blue water to be returned to the watercourse
- .3 The Contractor is responsible for the stability and water tightness of the cofferdams under all loading conditions. Brown water and blue water separation/isolation must be ensured.

.8 Expect water seepage through bedrock cracks, around or under dewatering structures. Be responsible to perform any and all work required to ensure sufficient water tightness of cofferdams, including bedrock grouting where necessary.
- .1 Sediment, debris and marine vegetation in water basin bottom may require regular cleaning and maintenance of pumps.

.9 Plan for dewatering system to include:
- .1 Initial Dewatering System:
  - .1 enough high capacity pumps.
  - .2 Pump capacity to allow for both managing the expected rate of seepage and dewatering the dewatering zone in a reasonable amount of time, such that it will not cause delays to the construction schedule.
- .2 Continuous Dewatering System:
  - .1 Continuous dewatering system to be setup in each dewatering zone.
  - .2 Total combined capacity for pumps to be greater than twice expected rate of seepage.
- .3 Emergency Backup Dewatering System:
  - .1 Emergency backup dewatering system to be setup to rapidly dewater work areas in the event of a failure of dewatering structures

or dewatering systems. Typically, one of the initial dewatering pumps left in place.

.4 Install additional pumps to increase pumping capacity and act as backup if required flow rates are not achieved.

.5 Immediately replace pumps that fail to perform continuously and reliably.

.10 At all times, maintain environmental quality of water to Section 01 35 43 - ENVIRONMENTAL PROCEDURES.

.11 Ensure that no phase of Work threatens safe performance of dewatering systems.

.12 Security measures for navigation shall be as per Section 01 55 26 - TRAFFIC CONTROL.

1.10 WATER LEVEL

.1 Design dewatering structures to withstand overtopping.

.2 1:40 year flood:
.1 Upstream water level: 241.8 m
.2 Tailwater level at bridge: 240.5 m
.3 Tailwater at existing dam in presence of cofferdams: 241.5 m

.3 Monitor and control, if required, the water levels during main construction work after the cofferdam is in place as illustrated on the associated drawings. Report abnormal or suspiciously high or low water levels to Departmental Representative immediately.

.4 In the event of extreme precipitation events or freshet, monitor the water levels closely and report to the Departmental Representative immediately of any unusually high water levels or flow conditions.

1.11 ENVIRONMENTAL REQUIREMENTS

.1 Refer to Section 01 35 43 - ENVIRONMENTAL PROCEDURES.

.2 Dispose of water so it does not create a safety or health hazard; or cause damage to environment, to adjacent property or to any portion of Work, or cause erosion of river banks or channel banks.

.3 Prior to dewatering the work area, remove any aquatic species (fish and turtles) according to approved environmental plan. Work to be supervised by a knowledgeable and competent fishery expert.

.4 Install environmental systems to capture sedimentation during in-water works including installation of

cofferdams and accesses in accordance with Section 01 35 43 - Environmental Procedures.

.5 Install environmental systems to capture sedimentation prior to release of water into waterways in accordance with Section 01 35 43 - Environmental Procedures.
.1 Prevent additional erosion when discharging water.

.6 Devise and implement drainage system inside the cofferdam to separate seepage through cofferdam from construction contact water. Cofferdam seepage that meets the discharge criteria (blue water) can be pumped directly back in the waterways. All construction contact water (brown water) shall be treated to meet the specified discharge criteria before discharging the water into the waterways.

1.12 PROTECTION

.1 Protect dewatered work spaces from damage due to floods, rain, ice, snow or other adverse climatic conditions.

.2 Train staff for safe operation of dewatering and diversion works.

.3 Provide monitoring measures to ensure a timely response to waterway flow adjustment requests (2 hours response time) by Parks Canada and any emergency conditions.

.4 Provide back-up equipment as necessary to maintain a dry working area. Provide measures to monitor dewatering equipment.

.5 Where construction activities impact residential well water supplies, or residential river intake supplies, revise construction methodology to protect these water supplies. Alternatively, provide and maintain another supply source to the satisfaction of the Departmental Representative. Surface water lines are to be removed and returned to the property owners.

PART 2 - PRODUCTS

2.1 TURBIDITY CURTAIN

.1 Refer to Section 35 49 25 - TURBIDITY CURTAIN.

2.2 MATERIALS

.1 Use materials in good condition, accepted by Departmental Representative and suitable for use in the work.

.2 Do not use materials which may cause environmental damage to waterway or to land at or near work site. This includes materials which would cause turbidity in excess of limits specified in Section 01 35 43 - Environmental Procedures and Section 01 41 00 - Regulatory Requirements.

.3 The Plan (shop drawings) shall clearly demonstrate the materials to be employed and the methodology of installation, operation, maintenance, and removal along with restoration where applicable.

.4 If using sand bags for an interim measure, sand must be washed of fines before placing in the water. Bags are to be made of a synthetic reinforced material suitable for the purpose intended. The Departmental Representative may request a demonstration to confirm the filled bags can be installed and removed without any resulting turbidity.

.5 Small bags, chains or weights to anchor aprons:
- .1 Do not use material from bottom of basin to anchor apron.
- .2 Attach ropes to weights to ensure method of removal at end of work.

.6 Materials and methods proposed for use in the dewatering structure, as well as the dewatering system, are subject to approval by PCA’s Environmental Authority.

.7 Granular materials for use in cofferdams to be clean, washed granular materials, free of fines or silt.

.8 Membranes: rubberized membranes suitable for marine and cold water use.

.9 Filter fabric: to suit grain size characteristics of sediment, native soil and construction materials expected on site.

2.3 EQUIPMENT

.1 Pumps:
- .1 Provide pumps and all necessary accessories.
- .2 All pumps to be new, have recently been completely overhauled or have been serviced completely prior to delivery to the site. Each

pump to meet the rating requirements specified by the manufacturer for that model.

.3 Supply and install multiple pumps to carry out dewatering operations in accordance with accepted Dewatering Plan.

.4 Power source: Electric or fuel. Contractor responsible for power supply.

.5 Pumps to be able to operate in severe conditions under which work to be executed including; freezing temperatures, silty sediment, construction debris, marine vegetation and continuous use.

.6 Pumps to be equipped with screens and filters. Screens to be compliant with DFO Freshwater Intake End-of-Pipe Fish Screen Guideline when pumping in fish-bearing water to prevent impingement or entrainment of fish.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Evaluate, plan and execute Work to the design criteria, in a professional and prudent manner giving due consideration to:

.1 Climatic conditions which may occur at work location during period of doing work in its entirety

.2 Safety of personnel and of general public including boating traffic.

.3 Safety of Work and of adjacent property and structures.

.4 Safety of removals.

.5 Safe operation (including training of staff) of operation of diverters and other equipment to maintain navigation and seasonal water levels.

.6 Maintaining navigation at the Lock.

.7 Maintain Environmental requirements.

.8 Clearance requirements for Work.

.9 Irregularities of adjacent surfaces.

.10 Residential water supplies in the vicinity of the Work area.

.11 Changes in water levels.

.12 Minimize and manage risk associated with temporary Works including, monitoring and recording site conditions on a daily basis.

.13 Resolving site issues in a timely manner

3.2 LAKE LEVEL MANAGEMENT AND OPERATION OF SLUICES

.1 Departmental Representative to review operations at all bi-weekly meetings.

.2 Parks Canada remains the sole authority for decisions on operation of stop logs affecting the flow downstream of the dam.

.3 Parks Canada to operate all upper logs directly.

.4 Contractor to operate lower 4 logs using a temporary gantry upon request by PCA.

.5 Provide a communication protocol with Parks Canada Agency acceptable to all parties including the Departmental Representative. Protocol must include three diversion operator contacts from the Contractor and three from the Parks Canada Agency.

.6 Contractor to designate a diversion operator, and two back-up, for daily coordination on operations and gain heating, even when no operation is planned.
- .1 Contractor to advise PCA when contact is not available
- .2 An operator, and two back-up, must be on call at all times including off hours, holidays and vacations (24 hours a day, 7 days a week, 365 days a year) from when diversion sluices are operational at the end of phase 1 until the 6 north sluices are operational at the end of phase 2.
- .3 Operator response time to be under 2 h at all times.

.7 Maintain safe access to the operating sluices at all times.

.8 Existing stop log lifter path and rails are to stay clear of any element affecting its mobility, including snow and ice.

.9 Manual winches to be kept on site. Must be kept on the rails on the north side of sluice 6 during phase 2.

.10 Contractor to remove and salvage logs for commissioning and demolition.

.11 Gantry to be stored at south extremity in temporary deck extension after all operations.

.12 There will be no operation of Perry Creek Dam, nor is water allowed to flow through the lock or above the north closure wall.

.13 Temporary Gain heaters:
- .1 Contractor to bear energy cost for gain heaters
- .2 Contractor to switch gain heaters on and off to PCA’s request.

.3 Contractor to provide a short training on gain heater operation and maintain access to the system to PCA operation personnel in case of emergencies.

3.3 FAILURE TO OPERATE LOWER LOGS OF THE EXISTING DAM

.1 If the Contractor is unable to remove the lower 4 logs of sluices 8 to 12 during a flood event, PCA reserves the right as a last resort to mobilize the other sluices and flood the worksite to protect the residence around lovesick lake, the lock and Perry Creek Dam. Delays, repairs and dewatering paid by the Contractor.

.2 If the Contractor is unable to lower the lower 4 logs, Contractor must find an alterative solution to maintain lake and navigation levels. Alternative measures and delays to be paid by the Contractor.

.1 Water levels can drop quickly and Contractor must submit a contingency plan as part of the dewatering plan.

3.4 TEMPORARY EROSION AND SEDIMENTATION CONTROL

.1 Provide temporary erosion and sedimentation control measures to prevent erosion and discharge of sediment-bearing water runoff or dust to waterway, and adjacent road, according to the requirements of the Surface Water, Erosion and Sediment Management plan as well as applicable permits and approvals granted for the project. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

.2 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

.3 Section 01 35 43 – ENVIRONMENTAL PROCEDURES and Section 01 35 46 – ARCHEOLOGICAL AND CULTURAL PROCEDURES.

3.5 DEWATERING

.1 Dewater work spaces for the various tasks involved with the Work and maintain them in a fully dewatered state until Work is finished. Dewatering will require 24 hour maintenance and supervision including electronic monitoring of the dewatered area with automated alarms. As a minimum, maintenance will include;

.1 Preventive maintenance and refuelling of generators normally performed during any shift.
.2 Emergency repairs of minor complexity.
.3 Placing standby items in service.

.2 Continue dewatering operations to enable Work to proceed in the dry for duration of Work.

.3 Repeat entire dewatering procedure as often as may be necessary if flooding or other damage occurs before completion of Work, while ensuring adequate capacity in the staging facility for treatment of brown water

.4 Maintain the dewatered state by pumping from well-points and/or sumps.

.5 Ensure that any drawdown of the water surface due to pumping does not affect:

.1 The safety or quality of the Work.
.2 The stability of adjacent structures and embankments.

.6 Provide for Departmental Representative approval details of proposed dewatering or heave prevention methods, including dikes, well points, and sheet pile cut-offs.

.7 Avoid excavation below groundwater table if quick sand condition or heave is likely to occur.
.1 Prevent piping or bottom heave of excavations by groundwater lowering, sheet pile cut-offs, or other means.

.8 Protect open excavations against flooding and damage due to surface run-off.

.9 Work in the dry may continue once dewatering is complete.

.10 Provide settling facilities to remove suspended solids before discharging water into waterway and/or drainage areas, or provide filtration means. These measures are to conform to the requirements of the Dewatering and Wastewater Management plan.

.11 Minimize turbidity of the water around the site at all times during the construction period. Contractor to retain the services of a qualified biologist to assess the acceptable water turbidity during cofferdams construction and removal, as per Section 01 35 43 ENVIRONMENTAL PROCEDURES.

.12 Maintain dewatering equipment in safe operating condition at all times. Persons responsible for

dewatering equipment to be capable to taking pumps on and off line and performing minor maintenance on pumps (clearing blockages, etc.).

3.6 EQUIPEMENT

.1 General:
- .1 Provide equipment in safe operating condition and maintain it in a safe operating condition for entire period of use and/or standby for use on Work.
- .2 Provide skilled operators for equipment.
- .3 Undertake service and maintenance of equipment according to approved environmental procedures.

.2 Standards and Performance:
- .1 Provide equipment of such quality and in such quantity as to provide sufficient capability to perform essential functions of Work to the approved schedule.
- .2 Equipment that is working in channel / river shall meet all environmental requirements.
- .3 Equipment shall be inspected and serviced regularly. Provide copies of equipment inspection and service records when requested by the Departmental Representative.
- .4 Provide emergency equipment for spills of hazardous substances.
  - .1 Provide standby replacement for pumps and other essential dewatering equipment which may break down during Work.
  - .2 Keep this replacement equipment available on site for immediate use.

3.7 CLEAN-UP AND RECTIFICATION

.1 Prior to cofferdam removal, clean work area of accumulated silt, debris and other materials deposited as a result of the work activities.

.2 Remove all cofferdam materials to the original river bed level at the end of Work.

.3 Dispose of waste materials in an approved manner off of PCA property.

.4 All waste described as being subject to the provisions of the *Environmental Protection Act* (O.Reg 347), must be transported with a valid “Certificate of Approval for a Waste Management System” to a site approved by the Ontario Ministry of the Environment, Conservation and parks to accept waste.

3.8 MAINTENANCE

.1 Pumps
- .1 Maintain the pumps in good working condition at all times. When it is necessary to remove a pump for maintenance or repair, a pump or pumps with equal capacity will be substituted.
- .2 Maintain sufficient pump capacity to handle water seepage. Dispose of the water in accordance with the permitting and approval from Federal and Provincial agencies and PCA's Environmental Authority.

.2 Cofferdams
- .1 Use the services of a qualified professional Engineer, licensed in the Province of Ontario, for the inspection of cofferdams during construction.
- .2 Notify the Departmental Representative immediately and take immediate action to correct a sudden increase of seepage through the cofferdam, or significant damage or deterioration of a cofferdam.

3.9 REMOVAL OF COFFERDAMS, FLOW DIVERTER AND STABILITY WORKS

.1 At approved stages in Work, remove all cofferdams, temporary improvements, and dewatering systems to original bottom level. No cofferdam removals are to commence until the water up dam leak test has been conducted and repairs have been accepted by the Departmental Representative. No leaks will be tolerated.

.2 Remove all cofferdam materials to the founding soils (below erosion control measures) to the satisfaction of the Departmental Representative.

.3 Remove entirely all flow diverters. Restore the site to the original condition or better.

.4 Remove all stability works other than those approved to remain in accordance with Section 31 23 33.01 - Excavating Trenching and Backfilling. Restore the site to the original condition or better.

.5 Remove all temporary measures. Restore the site to the original condition or better to the satisfaction of the Departmental Representative.

.6 Dispose of all unwanted materials off-site as approved by the Departmental Representative.

.7 Do not dispose of any materials in river.

.8 Undertake removals to the requirements of the regulatory permits and approvals, and to Section 01 35 43 - ENVIRONMENTAL PROCEDURES.

3.10 REMOVAL OF DEWATERING WELL POINTS, TEST WELL, MONITORING WELLS AND PIEZOMETRES

.1 Undertake removal and decommissioning of dewatering well points, test wells, monitoring wells and piezometers to the requirements of O.Reg 903 (OWRA).
- .1 Retain a licensed driller to undertake the work.
- .2 Fully remove all wells and piezometers outside the Parks Canada right-of-way.
- .3 Decommission piezometers within Parks Canada lands by installing a bentonite mixture to the full depth, removing upper 0.2 m of conduit, and backfilling to finished grade.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 This Section specifies requirements for the upstream safety boom installation as part of the safety requirements for navigation as set out by Transport Canada Navigable Waters and the Canadian Dam Association Guidelines.
  .1 Safety boom and warning buoys will be supplied by the Contractor. The Contractor is also responsible for the design and installation.
  .2 The work under this section also includes supply and installation in-water anchors along with all new connecting cable/chain link and hardware components.

1.2 RELATED REQUIREMENTS

.1 Section 05 50 00 – METAL FABRICATIONS

.2 Section 03 33 00 – CAST-IN-PLACE AND PRECAST CONCRETE

.3 Section 35 49 25 - Turbidity Curtain

1.3 MEASUREMENT AND PAYMENT PROCEDURES

.1 There will be no separate measurement of Work described in this Section.

.2 Payment of this Section as set out in Section 01 22 01 MEASUREMENT AND PAYMENT

1.4 REFERENCES

.1 American Society for Testing and Materials International (ASTM)
  .1 ASTM D1505 - 18, Standard Test Method for Density of Plastics by the Density-Gradient Technique
  .2 ASTM A572/A572M - 18, Standard Specification for High- Strength Low-Alloy Columbium-Vanadium Structural Steel
  .3 ASTM C578 - 19, Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
  .4 ASTM A123/A123M - 17, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
  .5 ASTM A153/A153M – 16a, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

.6 ASTM F3125/F3125M - 19, Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions.

1.5 SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Submit manufacturer's instructions, printed product literature and data sheets for the floatation logs, and associated hardware and include product characteristics, performance criteria, physical size, finish and limitations

.3 Shop Drawings:
.1 Submit drawings stamped and signed by Professional Engineer registered or licensed in Province of Ontario, Canada.
.2 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.
.3 Provide floating unit assembly details including log to log connection, shore and in-water anchor connections.
.4 Provide drawing of total assembly indicating number of units required between each anchor.

PART 2 - PRODUCTS

2.1 DAM SAFETY BOOM SYSTEM

.1 Dam safety boom consists of flotation units and connector assemblies. The assembled boom will consist of interconnected floatation units that must provide a continuous demarcation boundary.

.2 Floatation units and connection assemblies shall be new units not previously used.

.3 Floatation units shall consist of an external encasement, internal foam fill and internal structural steel channel through which all external inter boom connections are attached.

.4 Each floatation unit shall be approximately cylindrical in shape.

.5 The nominal diameter, length minimum buoyancy as indicated.

.6 Each floatation log shall be designed to have a minimum buoyancy of 317kg and a minimum free board of 30 cm.

.7 Each floatation unit shall be designed to maintain its original buoyancy even if it is structurally damaged or punctured.

.8 Booms to be design for a full year use including ice loads.

.9 A fuse link shall be incorporated in each span and positioned such that if the fuse link is triggered, the boom will deploy but will not touch the dam and affect the operation of the sluices.

2.2 FLOATATION UNIT ENCASEMENT

.1 The encasement shall be rotationally molded using rotationally molding grade linear low density polyethylene or linear medium grade polyethylene.

.2 Polyethylene encasement shall have a minimum density of 0.935 g/cm3 as determined by ASTM D1505-68. The polyethylene shall be manufactured with antioxidants incorporated into the process and be UV-stabilized for long-term environmental exposure.

.3 The nominal wall thickness of the polyethylene encasement shall be a minimum of 4.3 mm.

.4 The standard encasement color shall be yellow (FS-13655) per Transport Canada requirements unless alternate colors are requested.

.5 Message /graphic, integrally molded into floatation unit polyethylene encasement and:
- .1 Be black in colour;
- .2 Lettering shall be 100 mm high Arial font or approved alternative;
- .3 Message to be centered on the front face.
- .4 Message to read:
  - .1 “DANGER - DAM AHEAD – KEEP OUT” for 50% of the boom units, and
  - .2 “DANGER - BARRAGE DEVANT – NE PAS APPROACHER" for 50% of the boom units;
- .5 Parks Canada Agency logo shall be 75 mm high and located on the left of the unit, on opposite face.

2.3 FLOATATION UNIT INTERNAL CORE

.1 The internal core of the floatation log shall be polystyrene foam meeting the requirements of ASTM C578 and shall have a minimum in-place density of 14.4 kg/m3 and a maximum in-place density of 19.2 kg/m3.

.2 Water absorption of polystyrene shall not exceed 3% by volume as tested.

.3 Polystyrene fill shall take up a minimum of 95% of the interior volume of the boom. Under no circumstances will the percentage of foam fill be less than 90% of the interior of the boom.

2.4 FLOATATION UNIT BALLAST

.1 Each floatation unit shall be reinforced and ballasted with a steel channel. Size and steel grade of the channel shall be in accordance to the manufacturer's recommendation.

.2 The channel shall be located on the interior of each floatation unit, and positioned on the bottom interior surface to provide anti-rolling features to the boom unit.

.3 Each channel must be secured to the floatation unit encasement with galvanized ASTM A325 bolts and a heavy wall external galvanized flat plate.

2.5 INTER BOOM AND ANCHOR CONNECTION HARDWARE

.1 All connecting hardware between floatation units and anchor shall consist of:
.1 Bottom steel connector plate,
.2 Load-rated safety clevis (shackle) and
.3 Load-rated welded links (chain).

.2 The connections between floatation units shall be engineered to minimize wear and maximize load- bearing capacity.

.3 Structural steel: ASTM A572/A572M, Grade 50 steel or approved equivalent.

.4 All components must be corrosion resistant. Steel components to be hot dip galvanized or stainless steel type 304 or 316.

.5 Bolts, nuts and washers: to ASTM F3125/F3125M, hot dipped galvanized to ASTM A153/A153M, unless otherwise approved.

.6 Connection clevis (shackle) shall:
.1 Have a minimum pin diameter of 3/4-inch (19mm), be of a safety type with a heavy-hex style castle nut, lock washer and cotter pin.
.2 Have a Working Load Limit of not less than 4.3 tonnes. The Working Load Limit rating shall be clearly identified on the body of each clevis.

.7 Chain: Hot dipped galvanized, grade 30 proof coil, size as indicated on the contract drawings.

.8 Shackles must be stainless steel or hot dipped galvanized sized to suit connection and rated for loading requirements.

.9 Connection assemblies must permit minimum rotation of 90 degrees between floatation units (horizontal plane) and must allow movement to account for wave action.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Safety boom:
.1 The Contractor shall be responsible to place and align all field placed shoreline and in-water anchors.
.2 Install in accordance with manufacturer's instructions and as indicated on the Contract drawings.
.3 Do not make alteration to system components without written permission of Departmental Representative.
.4 Individual section of boom shall be connected to shoreline anchor or in-water anchor with separate clevis (shackle), unless otherwise indicated.
.5 Ensure the warning message facing upstream for the upstream boom, and facing downstream. Alternatively place boom units with English and French warning message.

.2 Safety boom anchors:
.1 The Contractor shall be responsible to supply, transport and install and align all field placed cast-in and in water anchors.
.2 Contractor to install in accordance with anchor design and manufacturer's instructions.
.3 Location of on-shore and mid-stream anchors of safety booms is shown for indicative purposes

and must be coordinated with the Departmental Representative, as per design requirements.

3.2 TEMPORARY INSTALLATION

.1 Design Safety boom so it can be installed in phase 1.
  .1 Install all central sections in final location
  .2 Install both end sections temporarily so they do not interfere with the work and can be moved to their final location upon completion of the work this may include temporary anchors, temporary subdivision of end section, installation of a temporary opening for marine construction traffic., etc…

3.3 CONSTRUCTION

.1 Comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

.2 For installation of anchors, provide sediment control measures acceptable to the Departmental

3.4 FIELD QUALITY CONTROL

.1 Site Tests / Inspections.
  .1 Provide Departmental Representative with minimum of 10 days’ notice of date of beginning Work on safety boom assembly and provide access to Work for inspection.
  .2 Safety boom constructed in whole or in part without inspection will not be accepted.
  .3 Final inspection of safety boom will be made in place. Contractor to assist with access for inspection.
  .4 Individual units are to be inspected by the Departmental Representative prior to installation.
  .5 Evidence of units having a lack of buoyancy, or are damaged, as determined by the Departmental Representative will be cause for rejection.

END OF SECTION

PART 1 - GENERAL

1.1 DESCRIPTION

.1 This section describes the specifications for the Turbidity Curtain required for protection of water courses and fish habitat which apply to the Work. These requirements apply to all Sections of this Specification, without limiting the conditions and approvals imposed by statute.

.2 Departmental Representative will monitor the implementation of turbidity curtains and will identify whenever such measures are found to be ineffective.

.3 Comply with environmental requirements of Contract Documents, applicable federal, provincial, and local acts regulations, and ordinances of Agencies having jurisdiction.

1.2 RELATED REQUIREMENTS

.1 Section 35 20 22 - DEWATERING.

1.3 MESURAMENTS AND PAYMENT

.1 No separate measurement for payment shall be made for items under this section. Include cost in the contract Lump Sum Amount.

.2 Payments related to this Section shall be as set out in Section 01 22 01 – Measurement and Payment.

.3 There shall be no further compensation for modifications to the sediment and erosion control plan including the turbidity curtain should this plan need to be modified to meet the permitting requirements and/or the monitoring specifications.

1.4 REFERENCES

.1 Canadian General Standards Board (CGSB)
  .1 CAN/CGSB-4.2 NO. 0-2001 (2013), Textile Test Methods Moisture Regain Values, SI Units Used in CAN/CGSB-4.2 and Fibre, Yarn, Fabric, Garment and Carpet Properties.
  .2 CAN/CGSB-148.1, Methods of Testing Geosynthetics.
    .1 No.2-M85, Mass per Unit Area.
    .2 No.3-M85, Thickness of Geotextiles.
    .3 No.6.1-93, Bursting Strength of Geotextiles Under No Compressive Load.

.4 No.7.3-92, Grab Tensile Test for Geotextiles.
.5 No.10-94, Filtration Opening Size.

.2 Canadian Standards Association (CSA)
.1 CSA G40.20-13/G40.21-13 (R2018), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
.2 CSA G164-18, Hot Dip Galvanizing of Irregularly Shaped Articles.

.3 American Society for Testing and Materials (ASTM)
.1 ASTM D4491/D4491M - 17, Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
.2 ASTM D4595 - 17, Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method.
.3 ASTM D4716/D4716M - 14, Standard Test Method for Determining the (In-Plane) Flow Rate Per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head.
.4 ASTM D4751 - 20, Standard Test Method for Determining Apparent Opening Size of a Geotextile.
.5 ASTM A123/A123M - 17, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

.4 Ontario Provincial Standard Drawings (OPSD)
.1 OPSD 219.260 November 2015, Turbidity Curtain.
.2 OPSD 219.261 November 2015, Turbidity Curtain, Seam Detail.

.5 Ontario Provincial Standard Specification (OPSS)
.1 OPSS.PROV 51,8 November 2016, Construction Specification for Control of Water from Dewatering Operations.
.2 OPSS.MUNI 805, November 2018, Construction Specification for Temporary Erosion and Sediment Control Measures.

1.5 SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – SUBMITTAL PROCEDURES.

.2 Submit Dewatering and Wastewater Management Plan in accordance with site specific EMP and ESG, as per Section 01 35 43 – ENVIRONMENTAL PROCEDURES and Section 01 35 46 – ARCHEOLOGICAL AND CULTURAL PROCEDURES.

.3 Provide details of temporary turbidity curtain system at least 20 working days prior to commencing work.

.4 Submission to include:
- .1 Materials data sheets for geotextile.
- .2 Installation, monitoring, maintenance and removal procedure.
- .3 Installation drawings.
- .4 Seam details.
- .5 Anchoring details.

1.6 DELIVERY AND STORAGE

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements with manufacturer's written instructions.

.2 During delivery and storage, protect geotextile from direct sunlight, ultraviolet rays, excessive heat, mud, dirt, dust, debris, pests and damage.

.3 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Geotextile:
- .1 New, woven, synthetic fiber fabric geotextile or geomembrane.
- .2 Width: as indicated on the Drawings.
- .3 Length: as indicated on the Drawings.
- .4 Composed of: minimum 85% by mass of polypropylene with inhibitors added to base plastic to resist deterioration by ultra-violet and heat exposure for 60 days.
- .5 Physical properties:
  - .1 Tensile Strength: minimum 1350 N, wet condition to CAN/CGSB-148.1.
  - .2 Elongation at break: maximum 25%.
  - .3 Seam Strength: minimum 1350 N equal to or greater than tensile strength of fabric.
  - .4 Mullen burst strength: 4000 N minimum, equal to or greater than tensile strength of fabric to CAN/CGSB-4.2, method 11.2.
- .6 Hydraulic Properties:
  - .1 Apparent opening size (AOS): to ASTM D4751.
  - .2 Low Permeability synthetic material or geotextile impregnated with elastomeric spray.

.2 Securing pins and washers: to CAN/CSA G40.20/G40.21, Grade 300W, hot-dipped galvanized with minimum zinc coating of 610 g/m2 to ASTM A123/A123M.

.3 Turbidity Curtain Hardware: to OPSS 805.

.4 Seams: sewn in accordance with Manufacturer's recommendations.

.5 Thread for sewn seams: equal or better resistance to chemical and biological degradation than geotextile.

.6 Design filter material to consider grain size characteristic, and the principals of maintaining sufficient hydraulic flow and prevention of particle movement through the material.

PART 3 - EXECUTION

3.1 GENERAL

.1 Turbidity curtains shown in contract drawings are not designs but conceptual representations. Contractor to design turbidity curtain as a function of work sequence, flow condition and work methods. Turbidity curtain may require doubling, extending, moving, repairing, sealing and any other installation or changes to fulfill the turbidity containment objectives as set out in the Section 01 35 43 – ENVIRONMENTAL PROCEDURES.

.2 Install turbidity curtain after acceptance of Dewatering and Wastewater Management Plan.
  .1 Plan to consider areas that may be dry at start of work and wet at end of work.
  .2 Co-ordinate use of sediment barriers and turbidity curtains for overall sedimentation control plan.

.3 Supply, install, maintain and remove upon completion of work, turbidity curtains where work may release sediment or materials into waterway.

.4 Use turbidity curtain during the installation and removal of cofferdams and other in water works. Maintain turbidity curtain in water around all working areas during construction.

.5 Use turbidity curtain during in-water demolition work. Maintain turbidity curtain in water around all working areas during construction.

.6 Inspect turbidity control measures daily to ensure proper functioning and maintenance.

.7 Stop Work in immediate area if control measures are not functioning properly until problem is addressed and accepted by Departmental Representative.

.8 Turbidity curtains should not be used as a primary or secondary settling area for dewatering activities. Supplementary sediment and erosion control measures should be installed prior to construction activities and should be added upon/reinforced as necessary.

.9 Take turbidity and total suspended soils measurements of water immediately outside turbidity curtain, as per Section 01 35 43 – ENVIRONMENTAL PROCEDURES and Section 01 35 46 – ARCHEOLOGICAL AND CULTURAL PROCEDURES.

.10 Submit test results as a part of Water Quality Testing Reports.

.11 Eliminate unnecessary sources of sediment by ensuring flow is prevented from entering the project site.

3.2 INSTALLATION

.1 Turbidity curtains to consist of turbidity curtain geosynthetic fabric, load line, flotation, ballast, anchors, mooring buoys, mooring lines, adjustment lines and tie-downs.

.2 Turbidity curtains are to be anchored or weighted down along its length to form a continuous seal on the river bed with adequate flotation at water surface to prevent over spills of turbid water.

.3 Design turbidity curtain to conform to Ontario Provincial Standard Specification, OPSS.MUNI 805 and Ontario Provincial Standard Drawings: OPSD 219.260 and OPSD 219.261 as a minimum.

.4 Construct turbidity curtains as follows:

- .1 Provide flotation support along full length of turbidity curtain.
- .2 Form heat-sealed or sewn sleeve along entire bottom edge of the turbidity curtain geosynthetic to contain ballast.
- .3 Breaks may be made in sleeve to facilitate pulling, provided they are 100 mm minimum in size and spaced at minimum 3 m intervals.
- .4 Where turbidity curtain geosynthetic fabric sections are joined to provide continuous run, provide continuous seal to prevent escape of turbid water between sections.
- .5 Turbidity curtain to be of sufficient width to account for expected variations in water depth and wave or ice action.
- .6 Place adjustment lines at maximum intervals of 10 m, and encircle turbidity curtain from top to bottom.

.7 Prepare turbidity curtain for installation by furling and tying with furling ties every 1.5 m for entire length of the curtain.
.8 Place turbidity curtain as close as possible to work area to trap sediment in as small an area as possible for clean-up.
.9 Anchor locations to be established as necessary to maintain turbidity curtain in place and functioning.
.10 Install turbidity curtains directly outside of dewatering structures where construction activity takes place.
.11 Provide buoys or other navigation markers to identify the location of the turbidity curtain to boaters to Transport Canada standards.

3.3 OPERATION AND MAINTENANCE

.1 Install turbidity curtains to prevent sediment passage, from the work area enclosed by the curtain to the remaining water body.
.1 Install multiple turbidity curtains if required to isolate individual work areas or around activities that may cause increased sedimentation.

.2 Install and maintain turbidity curtains in a manner that avoids entry of equipment, other than hand-held equipment or boats, to remaining water body.

.3 Only the working end of machinery shall directly enter the water.

.4 Equipment permitted in work areas to be enclosed by turbidity curtain.

.5 Operate and maintain turbidity curtain, with entire top edge above water or ice surface.

.6 Curtain to be free of tears and gaps, and the bottom edge of curtain to be continuously in contact with the water course bed so that sediment passage from the area enclosed is prevented.

.7 Regularly monitor folds which form in turbidity curtain next to floatation collar and remove collected sediment.

.8 Monitor and maintain turbidity curtain booms both during and outside normal working shifts as required.
.1 Provide personnel, materials and equipment necessary to maintain, repair or relocate turbidity curtain system.

.2 Maintain standby supply of geotextile equal to the length of turbidity curtain in-place.
.3 Repair turbidity curtain immediately if curtain is not performing correctly.
.4 Adjust setup of turbidity curtain as work evolves.
.5 Submit proposed changes to turbidity curtains for acceptance by Departmental Representative.

.9 Carry out construction operations to minimize impact on fish habitat from both disturbed sediments and fill materials.

.10 Adjust setup of turbidity curtain immediately as work evolves or when curtain is not performing correctly. Submit proposed changes for acceptance by Departmental Representative.

.11 Replace damaged or deteriorated geotextile to approval of Departmental Representative.

.12 Remove heavy accumulation of sediment or debris due to heavy leakage of sedimentation from waterway bottom before removal of dewatering structures and dewatering systems.

.13 Remove turbidity curtain when authorized by the Departmental Representative after completion of the work.

.14 Remove control measures in a way that prevents escape or re-suspension of sediments.

END OF SECTION

PART 1 - GENERAL

1.1 DESCRIPTION

.1 This section covers the requirements for the supply of one (1) mobile steel A-Type gantry crane, equipped with swivel lock casters and polyurethane wheels, for temporary steel stoplog insertion and removal, including two (2) manually operated chain hoists.

.2 Design, fabricate, assemble, pre-delivery test, transport and deliver, set to work on the dam site and commission the stoplog lifting system according to the requirements and standards described in this section.

.3 The drawings attached to the tender documents are not intended to be "shop" or "working" drawings. Sizes and/or arrangements shown are only intended to illustrate a feasible engineering solution to the requirements of this specification. The Contractor is expected to adopt a design meeting these requirements and be fully responsible for the equipment supplied in every respect.

1.2 RELATED REQUIREMENT

.1 Section 05 50 00 – METAL FABRICATIONS

.2 Section 09 97 01 – PAINTING STEEL SURFACES

.3 Section 35 20 17.01 – TEMPORARY STEEL STOPLOGS SILLS AND GAINS

1.3 REFERENCES

.1 American Society of Mechanical Engineers (ASME)
  .1 ASME B30.16-2017, Overhead Underhung and Stationary Hoists.
  .2 ASME HST-2-2019, Performance Standard for Hand Chain Manually Operated Chain Hoists.
  .3 ASME B30.26-2014, Rigging Hardware – Safety Standard for Cableways, Cranes, Derricks, Hoists, Hooks, Jacks and Slings

.2 American Welding Society (AWS)
  .1 AWS D1.1/D1.1M – 2020, Structural Welding Code - Steel.

.3 American National Standards Institute (ANSI):
  .1 ANSI B30.11-2010 Monorails and Underhung Cranes – Safety Standard for Cableways, Cranes, Derricks, Hooks, Jacks and Slings

.4 American Institute of Steel Construction (AISC):
.1 AISC Steel construction Manual of Steel Construction (2017).

.5 ASTM International
.1 ASTM A36/A36M – 19, Standard Specification for Carbon Structural Steel.
.2 ASTM F3125/F3125M - 19, Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions.

.6 CSA International
.1 CSA G40.20-13/G40.21-13 (R2018), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
.2 CSA W47.1-19, Certification of Companies for Fusion Welding of Steel.
.3 CSA W48-18, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).
.4 CSA W59-18, Welded Steel Construction.
.5 CSA W178.2-18, Certification of welding inspectors.

.7 Occupational Safety and Health Administration (OSHA)
.1 OSHA 1910.179, Overhead and Gantry Cranes

1.4 PERFORMANCE REQUIREMENTS

.1 Determine the nominal lifting load required to operate the temporary steel stoplogs under the most severe conditions, for lowering stoplogs in flowing conditions and taking into account friction and hydrodynamic loads.

.2 Coverage: Gantry Crane shall provide coverage of a rectangular area of size and consist of:
.1 Standard I-beam and hardware assembly
.2 A-Frame fabricated from mechanical tubing.
.3 Casters and polyurethane wheels.

.3 Modular, pre-engineered design: Crane system shall be designed as fixed height, disassembly, relocation, and for minimum effort manual operation.
.1 Gantry Crane shall be designed, fabricated, and installed in accordance with ANSI B30.11 and OSHA 1910.179.

.4 Deflection Guidelines: All Steel Gantry Crane shall be designed with a maximum deflection of L/600.

.5 Gantry Crane Operating Temperature: -20 to 40 degree C

.6 Structural Design: The crane's structural design is based on live load capacity plus 15 percent for hoist and trolley weight and 25 percent for impact.

.7 Gantry Crane shall be designed to withstand:
.1 Crane and hoist dead load
.2 Live load capacity equal to net rated hook load
.3 Inertia forces from crane and load movement

1.5 SUBMITTALS

.1 Calculations:
.1 Submit for review by the Departmental Representative all design calculations including calculations called for in other paragraphs of this section.
.2 Submit calculations covering the gantry crane for the manual chain hoists.

.2 Submittal Procedures:
.1 Product data is included for gantry crane, chain hoists and all accessories. Product data provides capacities, performance, standard operations, and applied forces to foundation.
.2 Shop drawings, which outline gantry crane and manual chain hoist configuration, dimensions, construction, and installation details.
.3 Manufacturer's Warranty
.4 Manufacturer's installation instructions
.5 Manufacturer's operation and maintenance manual

1.6 RESPONSIBILITY

.1 The purpose of these specifications is not to describe in detail the methods of manufacturing of the gantry crane system. The pertinent drawings attached to this section of the specifications, while attempting to give as fair a representation of the installation as possible, do not claim to define the final detailed design of the stoplog gantry system to be supplied. The Contractor is fully responsible for providing the gantry crane system that meets the needs of the Owner with regard to performance, reliability and durability and that adapts to the civil engineering design of the structure. However, the design as well as the manufacturing, the assembly and the operating mode must comply with the basic criteria, codes and standards specified in these specifications and these cannot be modified without the acceptance of the Owner's Representative.

.2 Contractor is responsible in supplying the gantry crane system that can be lower and raise the temporary steel stoplogs described in Section 35 20 17.01 in

flowing conditions in the embedded gains with manual chain hoists only.

.3 The Owner Representative has determined the dimensions of the water passageways, the type and location of the gates and their method of operation.

.4 Coordinate the design work, manufacturing and installation until the work has received final approval.

1.7 QUALITY ASSURANCE

.1 Standard cranes shall be designed, fabricated, and installed in accordance with ANSI B30.11, MH27.2, OSHA 1910.179, and IBC. If different specifications are required, alternate specifications need to be requested before the order is placed. Crane modifications may be required at additional cost to conform to specifications other than IBC and ASNI.

.2 Manufacturer's or Contractor's Qualifications: A company with more than 30 years of experience successfully designing and manufacturing cranes and material handling solutions for numerous industries.

.3 Installer's Qualification: A company that is acceptable to the crane manufacturer and with five years of experience assembling and installing cranes for multiple applications. Installer should be able to:

.1 Perform welding using certified operators in accordance with AWS D1.1/D1.1M.

.2 Bolt connections in accordance with torque tightening procedures specified in AISC Manual, Part 5.

.3 Clearly label crane with rated load capacity with label visible from floor level and loading position.

.4 Perform OSHA Load Test Certification.

1.8 DELIVERY, STORAGE AND HANDLING

.1 Project Conditions

.1 Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results.

.2 Do not install products under environmental conditions outside manufacturer's absolute limits.

.2 Delivery, Storage, and Handling

.1 Store products in manufacturer's packaging until ready for installation.

.2 Store and dispose of solvent-based materials in accordance with requirements of local authorities.

1.9 HYDRAULIC DATA AND GENERAL DIMENSIONS

.1	Single Stoplogs quantity per sluice bay:	1
.2	Number of sluice bays:	5
.3	1:40 year water level (design level)	241.80 m
.4	Level of the deck:	244.38 m
.5	Level of the temporary stoplog sill:	237.82 m
.6	Clear width of all water passageways:	6.096 m

1.10 LOADING CONDITIONS

.1 Except where otherwise indicated, calculate all materials for which allowable stresses are not covered in these specifications, using a safety factor of at least 5 compared with their ultimate limit.

.2 Design temperatures
.1 Design the equipment to function adequately when subjected to temperature variations between -40°C and +40°C.

.3 Design load
.1 Design the structural components of the hoist to be capable of remaining stable under, and withstanding, within the limits of allowable stresses, in the case of loads resulting from the most unfavourable combination possible for the following loads:
.1 All dead loads, live loads, impacts and vibrations induced by the gantry crane under normal operating conditions. Increase all loads produced by the nominal capacity of the hoist by 25% to take into account the impact loads;
.2 All dead loads, live loads, impacts and vibrations induced by the gantry crane under exceptional operating conditions. Assume these loads to induced by the maximum torque of the hoist motor and transmitted to one of the two lifting points;
.2 Calculate the nominal lifting load required by combining the most unfavourable of the following loads:

.1 The weight of a stoplog described in section 35 20 17.01.
.2 Maximum hydrostatic pressure exerted on the stoplog section corresponding to 1:40 year flood forebay level (EL 241.81 m);
.3 All forces acting on the stoplog, when it is moving or stopped, that is during its installation or removal whatever the variations in upstream and downstream levels are for the range of predictable variations;
.4 All forces resulting from the jamming of a stoplog in the guides during which time the hoist motor develops its maximum torque;
.5 All possible lifting and friction loads acting independently or together with those defined previously.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Welding materials: Conform to CAN/CSA W48 and certified by the Canadian Welding Bureau.

.2 Steel: conform to Structural steel to CSA G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality/Structural Quality Steel.

2.2 USE OF TEMPORARY GANTRY CRANE STOPLOG LIFTING SYSTEM

.1 The function of the temporary stoplog lifting system is to remove or insert stoplogs in the gains of the existing sluiceway which will be modified to be used as a diversion structure during the construction of the new dam.

.2 Sills will be lowered for five (5) sluiceways (8 to 12) on which the temporary steel stoplogs will be installed. Timber stoplogs will be placed on top of the temporary steel stoplogs with the existing stoplog lifter by PCA.

.3 Sufficiently long load chains to be fixed to the temporary stoplog lifting pins and the free extremity to be fixed on top of the service deck. Shackles may be used to attach the load chain to the stoplog lifting pins versus the usual hook that come with chain hoists.

.4 When lifting or lowering of the temporary steel stoplogs is required, the free extremity of the load

chain, fixed on the service deck, will be inserted in the hook of the manual chain hoist. Operators must not lift the weight of the chain during this operation

.5 The height of the gantry crane along with the manual chain hoist shall be sufficient to allow the stoplog assembly to be lifted up to the deck level.

.6 The gantry crane equipped with manually operated chain hoists are the only pieces of equipment on site with which to manipulate temporary steel stoplogs when required. It may have to be operated even during extreme events and temperature. It may also go several weeks without being used at all.

.7 All stoplogs removed from sluices are stored on the operating deck of the existing dam.

2.3 DESIGN – GENERAL

.1 The gantry crane – manual chain hoist lifter system must be a safe, simple, rugged, machine designed for long life in its operating environment using industry-proven materials and methods.

.2 Manually operated chain hoists must be easy to repair with all components commercially available and easily accessible.

2.4 A-TYPE GANTRY CRANE

.1 Mobile Gantry to be of 15 short ton capacity

.2 Model:
.1 All steel fixed height gantry crane
.1 Portable, fixed height gantry crane with swivel lock casters and polyurethane wheels.
.2 Construction: Fabricated from ASTM A36/A36M steel sections with finished ends and surfaces.

.3 Design Factors
.1 Gantry Cranes to be designed to meet all specifications using a 25 percent factor of rated load for impact and 15 percent factor of rated load for hoist and trolley weight.

.4 Service Factor: Gantry Cranes to be designed for moderate usage (Class C Normal/Industrial service) as defined:
.1 System or equipment is used where operational time is less than 50 percent of the work period and lifted load is greater than 50 percent of rated capacity.

.5 Support Structure: Gantry Cranes to be portable with polyurethane wheels.

2.5 SYSTEM COMPONENTS

.1 Beam
  .1 Standard steel I-Beam

.2 A-Frame
  .1 Fabricated from mechanical tubing.
  .2 Fixed height.
  .3 Center tube adjusts in six-inch(152mm) increments.

.3 Casters
  .1 Four position swivel locking.
  .2 Polyurethane wheels.

2.6 SHOP FINISHING

.1 Standard Paint Colors:
  .1 Gantry painted yellow

.2 Surface Preparation and Painting Procedures:
  .1 Manufacturer to adhere to the standards of the Society for Protective Coatings (SSPC) for all product surface preparation.
  .2 Crane components are deburred and descaled using power tools equipped with sanding discs and wire wheels prior to painting.
  .3 Components are washed with high-pressure/ high temperature biodegradable degreaser solution.
  .4 All components are coated with quick drying, semi-gloss enamel, applied to a minimum dry-film thickness of two to thee mils.
  .5 A finishing coat is applied with a hot, airless, electrostatic spray paint system.
  .6 Painted components are cured at air temperature.

2.7 MANUALLY OPERATED CHAIN HOIST REQUIREMENTS

.1 The two (2) manually operated chain hoists shall have, as a minimum, the following features:
  .1 Minimum lifting capacity of a minimum of 8 short tons (US) or 16,000 lbs each.
  .2 Model to be chosen as per required load chain length.
  .3 Steel of cloth chain bucket.
  .4 Grade 100 Corrosion resistant load chain and stainless steel hand chain.
  .5 Body:
    .1 Durable over-sized body with all-steel construction.
    .2 Rugged gear case and hand wheel cover.

.3 Compact design for low headroom and lightweight portability.

.6 Brake:
- .1 Double pawl springs for reliable operation and instant brake activation,
- .2 Enclosed to protect from dust and rain.

.7 Gears
- .1 Double reduction gearing requiring very low effort to operate.
- .2 Induction heat-treated and case hardened.
- .3 Enclosed to protect from dust and water.

.8 Bearings:
- .1 Maintenance-free sealed bearings

.9 Plain or geared trolley mount

.10 Hook (if selected)
- .1 Cooper plated hook with heavy-duty hook latch.

.2 Acceptable Models:
- .1 KITO Model SHB100
- .2 COLUMBUS MCKINNON Hurricane 360 Model HU10000GB30
- .3 YALE YLITG Model ATEX 8000
- .4 HARRINGTON CB Model CB80 with plain trolley PT080 or geared trolley GT080
- .5 ZEPHYR Model 1311-8

.3 Contractor can propose other chain hoist models.

.4 Contractor to verify that proposed hoist corresponds to required features listed above.

.5 Submit the proposed hoist model for review by Departmental Representative.

2.8 LOAD CHAINS AND ACCESSORIES

.1 Load Chain
- .1 Ten (10) Grade 100 corrosion resistant load chains for the chosen manually operated chain hoists, of an appropriate length, which will have on extremity fixed to the temporary stoplog lifting pin by way of a shackle and the other extremity will be attached temporarily to the service deck using a chain quick link and an eye nut. A section of the load chain will be in the water when the stoplogs are in use. See article 2.2 of these specifications for the description of the attachement approach of these load chains into the manually operated chain hoists as well as the required length of each load chain.

.2 Shackles

.1 Alloy Screw Pin shackle, two (2) per temporary stoplog, ten (10) total, of a minimum capacity of 5 (5) short tons installed on the 25.4 mm bar of the top stoplog section and in which will be joined the extremity of the manual chain hoist load chain.

.3 Chain quick link
.1 Ten (10) steel chain quick link to secure the extremity of the load chain coming out of the water from the stoplogs to a forged eye nut attached to the concrete deck next to the rail and stoplog slots.

.4 Forged eye nut and mechanical concrete anchor
.1 Ten (10) forged steel eye nuts and threaded for the mechanical concrete anchor
.2 Ten (10) carbon steel wedge anchors on which the eye nuts will be fixed.

2.9 LUBRICATION REQUIREMENTS

.1 Provide all moving mechanical parts with lubrication unless otherwise noted.

.2 Selected lubricants must be suitable for temperatures to be encountered at this site. As far as possible, rationalize number of different types of lubricants required to minimum.

.3 Locate the lubrication points to be safely accessible without the need of fall restraint or fall arrest equipment.

.4 Each lubrication point shall have its individual servicing inlet.

.5 Provide all grease lubrication points with the same size, make and model to fitting. The grease fittings are to be self-sealing types.

.6 Provide a numbered or lettered tag at each lubrication point corresponding to lubricant schedule and numbers on maintenance check-sheets.

.7 Submit Material Safety Data Sheet (MSDS) for all lubricants used.

PART 3 - EXECUTION

3.1 PREPARATION

.1 DO NOT start installation until support structures are properly prepared.

.2 Inventory:
.1 Check materials to ensure all parts are present.

.3 Foundation:
.1 Gantry is completely portable and require no foundation or structural support.

3.2 WORKING ENVIRONMENT

.1 Temperature -40°C to +40°C

.2 Relative humidity: 20% to 100%

.3 Roadway salt spray and local industrial emissions equivalent to a marine industrial environment.

.4 Snow accumulation

.5 Freezing mist

3.3 INSTALLATION

.1 Units and accessories should be installed in accordance with manufacturer’s instructions and shop drawings.

.2 Do not modify crane components without manufacturer’s approval.

.3 Clearances for moving crane components:
.1 Minimum vertical clearance: Three inches (76 mm) from any overhead obstruction.
.2 Minimum horizontal clearance: Two inches (51 mm) from any lateral obstruction.

.4 Assembly:
.1 Select an area under an overhead hoist to raise the I-beam.
.2 Lay both frames flat on the floor and slide upright tube into top of center tube. Pin upright tube in its lowest position to ensure that load pin is fully engaged.
.3 Lock the caster wheels in position parallel to the frame. This will prevent the frame assembly from rolling away when lifted to the upright position.
.4 Lift the I-beam to the gantry's minimum height. Be sure that the holes in the I-beam flange are

on the bottom and that the capacity rating is legible.

.5 Lift one end of the frame assembly into position under one end of the I-beam, and bolt I-beam to top plate of the upright with the hardware supplied. Be sure the lifting lug is on the outside of the frame assembly. Raise the other end frame into position and bolt together as outlined above.

3.4 FIELD QUALITY CONTROL

.1 Inspection
.1 Verify all bolts are tight and lock washers fully compressed.

.2 Field test
.1 Ensure crane operates properly (movement is smooth and consistent).
.2 Make adjustments as needed, and correct inadequacies.

.3 Acceptance test:
.1 OSHA requires an acceptance test before operating and also after any modifications. An authorized dealer or installer should perform acceptance tests.

.4 Maintenance
.1 To keep a gantry crane in good operating order, engineers recommend establishing a regular schedule of inspection and lubrication. All parts should be inspected, all loose parts adjusted, and worn parts replaced at once.
.2 Recommended lubrication schedule varies based on crane use/ application. A crane that operates daily for multiple should be lubricated weekly. Operating a crane at “standard duty” requires lubrication once every two or three weeks. Operating a crane on “standby classification” requires lubrication once every six months. The interval of lubrication depends on the application.

.5 Clean Surface
.1 Touch up scratches and blemishes with matching paint from manufacturer.
.2 Keep surfaces clean and clear of build-up and residue.

.6 Protect Gantry Crane
.1 Protect installed products until completion of project.
.2 Touch-up, repair, or replace damaged products before substantial completion.

.7 Quality Standards
.1 Gantry Crane manufacturer is an ISO 9001: 2008 Registered Corporation.
.2 Gantry Crane is manufactured to standards ensuring safety, reliability, and the highest quality.

3.5 LOADING CONDITIONS - DESIGN

.1 General:
.1 Design water elevation: as per article 1.9 as per this section of the specifications.
.2 Temporary Steel Stoplog dimensions: see section 35 20 17.01 Temporary Steel Stoplogs, Sills and Gains
.3 Gantry crane structure for manually operated chain hoists to be designed for design capacity of two (2) manual chain hoist as described in article 2.7 of this section of the specifications.

.2 Maximum weight of system:
.1 Include a factor for dynamic (impact) effects.
.2 Submit calculations.

3.6 PAINTING AND GALVANISING

.1 As per manufacturers standard colors and paint systems if not designed and fabricated by Contractor; otherwise submit a protective coating system for approval by Departmental Representative.

3.7 INSTALLATION

.1 Assemble the stoplog lifting hoist system at Contractor’s facility according to technical drawings and specifications for proof tests before delivery to Burleigh Falls Dam.

.2 Transportation to the dam may require partial disassembly.

.3 Provide protective blocking for lifting and transportation between factory and dam. Be responsible for rectifying all damage.

.4 Submit shipping weights of individual containers.

.5 Submit a written assembly procedure before beginning installation on site.

3.8 COMMISSIONING

.1 Acceptance Tests: To be conducted at dam site in presence of Departmental Representative after installation, who reserve the right to defer the tests for any reasonable reason, such as adverse weather, inadequate equipment and or compliance with safety standards. These tests must include but are not necessarily limited to:
  .1 Verify clearances to adjacent dam appurtenances before travelling.
  .2 Repeat tests from Proof Test (described in Part 1 of the present section excluding load tests.
  .3 Remove all logs from the sluice and place them on operating deck.
  .4 Fill sluiceway with logs from operating deck.

.2 Give Departmental Representative five (5) working days' notice before all Tests.

.3 Refer to section 35 20 17.01 Temporary Steel Stoplogs, Sills and Gains.

.4 Refer to section 01 91 13 – General Commissioning (CX)for testing the existing upper timber stop log operation using the existing log lifter.

3.9 SPARES, MAINTENANCE MATERIALS, AND TOOLS

.1 Provide new, undamaged, and of same quality and manufacture as products provided in Work.
  .1 Provide at minimum the following:
    .1 One (1) each of all special tools required for operation or maintenance fitted with waterproof tags specifying their function and associated equipment.

END OF SECTION